June 27, 2016

Mr. Scott Yount
BNN Western, LLC
4992 SW Buffalo Road
Towanda, KS 67144

RE: Wildhorse 16-13L SWD Water Handling Facility (ID #159962) Emergency Response, Environmental Oversight, and Confirmation Soil Sample Results Olsson Project #016-1077

Dear Mr. Yount,

BNN Western, LLC (BNN) retained Olsson Associates (Olsson) to perform environmental oversight of emergency response and cleanup efforts and collect confirmation soil samples for the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 soil parameters at the Wildhorse 16-13L salt water disposal (SWD) water handling facility (Site).

A lightning strike on the evening of May 6, 2016 resulted in an explosion of one of the produced water tanks and a fire the consumed the produced water tank battery and crude oil tanks on Site. The fire resulted in a produced water spill and a crude oil spill, both that remained on location, but were outside of the secondary containment. This letter summarizes the project activities and confirmation soil sample analytical results. The produced water spill and crude oil spill were reported to the COGCC on an initial Form 19 dated May 7, 2016. **Figure 1** shows the General Site Location, and **Figure 2** presents the Site Map included in **Attachment A**.

Site Location and Description
The Site is located in the northwest quarter of the southwest quarter in Section 16, Township 9 North, Range 59 West, of the Sixth Principal Meridian, with the approximate center point coordinates (40.748568 N; -103.990383 W). More generally the Site is located approximately six miles northeast of the ghost town of Keota, approximately twelve miles northwest of New Raymer, Colorado and approximately one mile east of the intersection Weld County Road (WCR) 111 and WCR 104. The Site is surrounded by non-crop land.

The water handling Site consisted of a pump building, trucking loading/unloading facilities, a produced water storage tank battery containing (12) 400-barrel (bbl) capacity aboveground storage tanks (AST), and two 750-bbl capacity gun barrel separators, a filtered water tank battery with (12) 400-bbl capacity, and two 400-bbl capacity condensate storage tanks. The surface owners of the land on which the Site is located are Wade and Todd Castor and the adjacent landowner is the Timbro Ranch and Cattle Company, LLC, both of whom were verbally notified of the incident on May 7, 2016. Copies of the initial and supplemental Form 19 are included in **Attachment B**.

The Wildhorse 16-13L SWD injection well is located on an adjacent well pad to the southeast and is co-located with the Wildhorse 16-13H, a producing oil and gas well, and a tank battery operated by Whiting Oil & Gas Corporation. The Wildhorse 16-13L SWD water handling facility stores filtered produced water for use in field hydraulic fracturing of oilfield production wells.

Emergency Response
Olsson personnel mobilized to the site on May 7, 2016 to assess the extent of the impact from the produced water and the crude oil spill that resulted from a lightning strike and fire the night before. Local first responders and BNN personnel isolated and secured the Site until the fire subsided. The produced water tank battery was still on fire at approximately 1:30 p.m. when Olsson met with BNN personnel on the adjacent Wildhorse 16-13L SWD injection well location. Olsson personnel observed pieces of fiberglass and sheet metal from the tank that exploded on the access road to the site, on the roof of the pump building, and in the field south of the Site. Site photographs are presented in **Attachment C**.

Initial volumes of spilled crude oil and produced water were estimated at more than 100 barrels. Approximately 3,005 barrels of produced water were released outside of secondary containment, combined with stormwater, water, and foam used in fighting the fire, and ran to the west and southwest of the facility pad location. Approximately 950 barrels of crude oil were released. Most of the crude oil was burned in the fire that destroyed the twelve 400-bbl capacity produced water fiberglass ASTs, the two 750-bbl capacity fiberglass gun barrel separators in the produced water tank battery, and the adjoining two 400-bbl capacity steel crude oil ASTs. One barrel of crude oil was recovered and 370 barrels of produced water were recovered using a vacuum truck to remove the produced water, stormwater, and water used in fighting the fire on May 7, 2016. More severe weather occurred in the area on the afternoon of May 7, 2016 and in the days following the incident.

The crude oil spill remained on the east side of the tank battery as shown in **Figure 2.** The Site map shows the extent of the produced water spill, and the crude oil spill, as well as the background soil sample, site characterization soil sample, and confirmation soil sample locations.

Site Characterization Soil Sampling
Site characterization was performed on May 11, 2016. Olsson personnel used a GX 7 Series Trimble global positioning system (GPS) unit to map the location of key features on the Site, the extent of the produced water spill, the extent of the crude oil spill, and plot the locations of the site characterization soil samples within the produced water spill area. Some salt leachate was observed as a white crust on the soil in the area of the produced water spill as the soil dried out on the afternoon of May 11. An investigation by the lightning suppression equipment company was also performed on May 11, 2016. A supplemental Form 19 was submitted to the COGCC on May 16, 2016.

BNN is a wholly-owned subsidiary of Tallgrass Energy. Olsson met with BNN and Tallgrass Energy (Tallgrass) environmental health and safety (EHS) personnel onsite to collect site characterization soil samples. A total of 16 characterization soil samples were collected from within the produced water spill area, and three background soil samples to assess natural background soil conditions were collected. Samples were not collected from the crude oil spill since the extent was obvious from the standing crude oil on location, and due to it being localized on the up gradient side of the tank batteries and piping. An earthen berm was constructed following the incident and prior to May 11 to contain the oil and prevent it from being washed away during subsequent storm events.

Soil samples were collected using a sharp-shooter shovel from 0 to 3-inches below ground surface (bgs) and were placed into laboratory provided 4-ounce wide-mouth glass sample jars. In four of the sample locations on Site, a soil sample was collected from 4 to 5 inches bgs, to assess the vertical extent of impact. The samples were labeled with the sample ID, date and time collected, analytical parameters, and the sampler's signature. The samples were stored on ice in a plastic cooler pending delivery to the laboratory under chain-of-custody protocols.

Background soil samples were collected from 0 to 3-inches bgs to the south, east, and west of the Site in areas that appeared undisturbed by construction activities. The background soil samples were submitted for the same analytical parameters as the characterization soil samples.

Soil samples were submitted to SGS Accutest Laboratories in Wheat Ridge, Colorado for analysis of pH by Method SW 846 9045D, Specific Conductivity, also referred to as electrical conductivity (EC) by Method SM 2510B-2011 Modified, and sodium adsorption ratio (SAR) by United States Department of Agriculture (USDA) Handbook 60 Method to assess the extent of the produced water spill impacts onsite. The SAR is a measure of soil sodicity calculated as the ratio of sodium divided by the square root of calcium and magnesium in milliequivalents per liter (Meq/L). A copy of the laboratory results report is presented in **Attachment D**.

The site characterization soil sample analytical results were compared to the COGCC Table 910-1 levels for these parameters and are summarized in Table 1 in **Attachment A**. The results showed surface impact from the produced water spill with pH that was above the Table 910-1 upper limit of 9.00 standard pH units, specific conductivity that was above 4 millimohs per centimeter (mmohs/cm) or two times background, and SAR that were above 12. It should be noted that the levels of these parameters are used to assess impacts to cropland and potential impacts to crop growth or native vegetation.

Soil samples were collected from depths of 4 to 5-inches bgs or 4 to 6-inches bgs at the SS-3D, SS-6D, SS-10D, and SS-15D locations to assess the vertical extent of the impacts. The results for these samples showed lower levels than the surficial soils and generally met the Table 910-1 levels. BNN personnel proposed excavation and disposal of the upper three inches of soil across the produced water spill area to reduce the pH, EC, and SAR levels.

Excavation Oversight

BHI Energy completed demolition of the damaged filtered water ASTs and conducted excavation activities on June 9, 2016. Olsson personnel performed environmental oversight to document the excavation activities for the removal of residual oil stained soil and to collect confirmation soil samples following excavation of the upper two to four inches of soil across the crude oil spill area. Underground utility locates had been performed and the locations of buried pipelines, electrical lines, and communications cables were marked with spray paint and pin flags prior to initiating excavation activities.

BHI Energy used a track mounted Kubota skid-steer in the excavation area to remove and stockpile stained soil. Olsson personnel used a Trimble GX 7 Series GPS unit to record the locations of the confirmation soil samples. Olsson personnel took photographs of the crude oil spill area and cleanup activities. The confirmation soil samples are shown on **Figure 3**.

A total of six confirmation soil samples were collected from the crude oil spill area following the completion of the excavation activities. Soil samples were collected using a sharp-shooter shovel and a stainless steel sampling spoon. The soil samples were labeled with the sample ID, date and time collected, the requested laboratory parameters, and the sampler's signature. The soil samples were placed into laboratory provided glass sample jars and were stored on ice in a plastic cooler pending delivery to the laboratory under chain-of-custody protocols.

The confirmation soil samples were submitted to SGS Accutest for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260, gasoline range organics (GRO) by EPA Method 8260, and diesel range organics by EPA modified Method 8015. The results for the confirmation samples are summarized in **Table 2** in **Attachment A**. A copy of the laboratory report for the confirmation soil samples is included in **Attachment E**.

BHI Energy personnel had constructed a plastic lined containment cell on the east side of the Site to store oily soils and gravel and stockpiled the excavated soils in the central part of the Site pending disposal at the Waste Management (WM) North Weld County Landfill located near the town of Ault, Colorado.

Confirmation Soil Sample Results

The SGS Accutest laboratory report showed that concentrations of benzene, toluene, ethylbenzene, and xylenes and GRO were not detected at or above the laboratory reporting limit in any of the six confirmation soil samples. The results showed that DRO was detected in two of the six confirmation soil samples, but at concentrations that were below the Table 910-1 concentration of 500 milligrams per kilogram (mg/kg) DRO. Therefore, the crude oil confirmation soil sample results show that these compounds were not detected or were at concentrations that are below the Table 910-1 concentrations.

Excavation Soil Stockpiles

Olsson personnel performed the final site inspection following removal of the tank battery containment, removal of the crude oil tanks, liners and debris on June 21, 2016. Olsson provided Waste Management (WM) manifests for removal of the crude oil and produced water impacted soil stockpiles.

There were a total of four soil stockpiles of impacted materials and one plastic lined containment for oil and oily soils and gravel. The four stockpiles consisted of between approximately 15 cubic yards and 25 cubic yards each of oil stained or produced water impacted soil and gravel and are scheduled for offsite disposal at the WM North Weld landfill.

Conclusion

No further action or remediation appears warranted at this time based on a comparison of the confirmation soil sample results with the COGCC Table 910-1 levels and the site specific background soil results. The May 6, 2016 produced water spill remained on location, and was mixed with stormwater and water used in fire suppression. BNN had vacuum truck transports pump up the water on May 7, 2016 to remove it prior to subsequent thunderstorms. An initial Form 19 was submitted on May 7, 2016 and was verbally called into the COGCC. A supplemental Form 19 was submitted on May 16, 2016.

The results for pH, EC, and SAR at depth of 4 to 6-inches collected on May 11, 2016 were generally below the Table 910-1 levels. The EC, pH, and SAR levels are elevated as compared

to the background soil samples; however, the background samples were collected from areas with topsoil and the confirmation soil samples from subsoil on the Site. The salinity of the subsoil may be higher than the topsoil according to data in the Soil Survey of Northern Weld County. BNN has excavated the upper three inches of the soils within the produced water spill area for offsite disposal and back dragged the spill impacted area of the Site.

The June 9, 2016 confirmation soil sample results show that BTEX and GRO were not detected at or above the laboratory reporting limits in the crude oil spill area. Concentrations of DRO were detected in two of the six confirmation soil samples but were less than the 500 mg/kg - Table 910-1 DRO concentration.

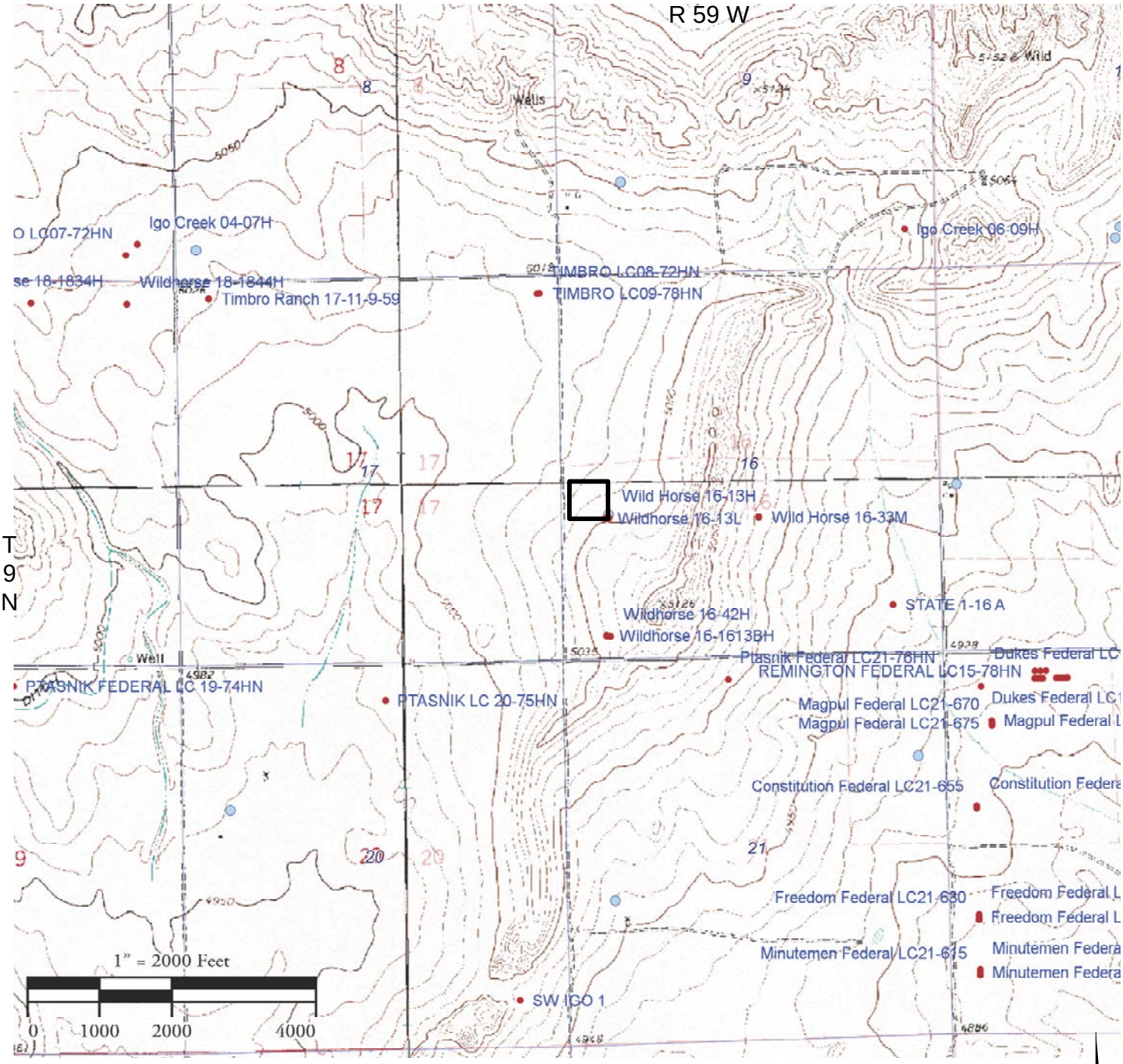
Olsson Associates appreciates the opportunity to participate in this project on behalf of BNN Western, LLC. If you have questions or require further information, please call us at 303.237.2072.

Sincerely,
Olsson Associates, Inc.

James W. Hix
Senior Geologist

Dana Mack
Team Leader

ATTACHMENT A
FIGURES AND TABLES



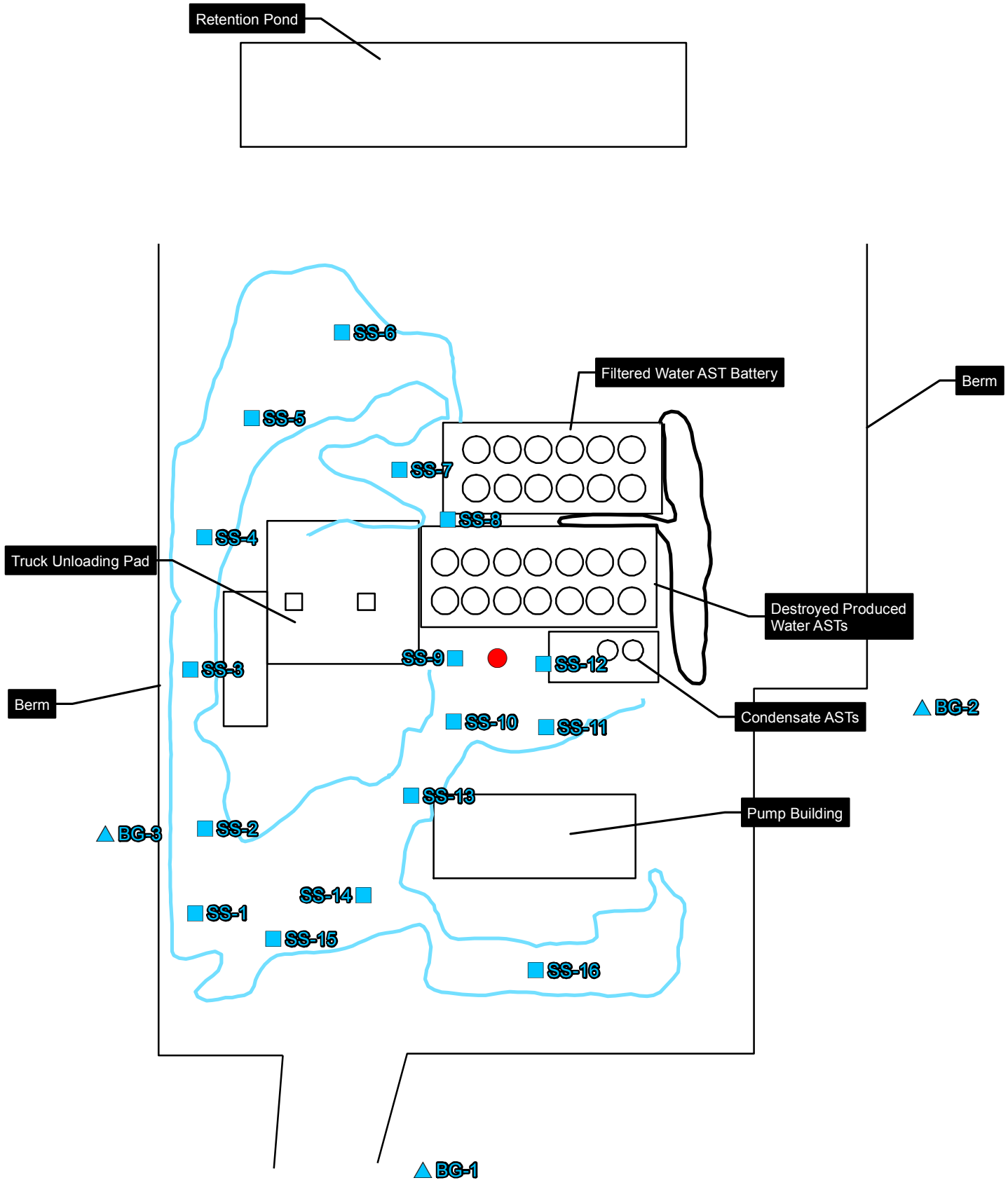
LEGEND:

- Site Location
- Oil and Gas Well Location
- Permitted Water Well Location

Source: COGCC GIS
USGS 7.5-minute
topographic map
Raymer NW, Colo.
1977

N

PROJECT NO: 016-1077	**SITE LOCATION MAP** **Tallgrass/BNN Wildhorse 16-13L SWD** **Emergency Response** **Weld County, Colorado**	OLSSON ASSOCIATES	4690 Table Mountain Dr. #200 Golden, CO 80403 TEL 303.237.2072 FAX 303.237-2659	FIGURE
DRAWN BY: JWH				1
DATE: 05/13/2016				



Legend

- Soil Sample Location
- Background Soil Sample Location
- Lightning Rod
- Crude Oil Release
- Produced Water Release

Site Layout
Tallgrass/BNN Energy
Wildhorse 16-13L SWD Release
Emergency Response
Weld County, Colorado
Olsson Project # 016-1077

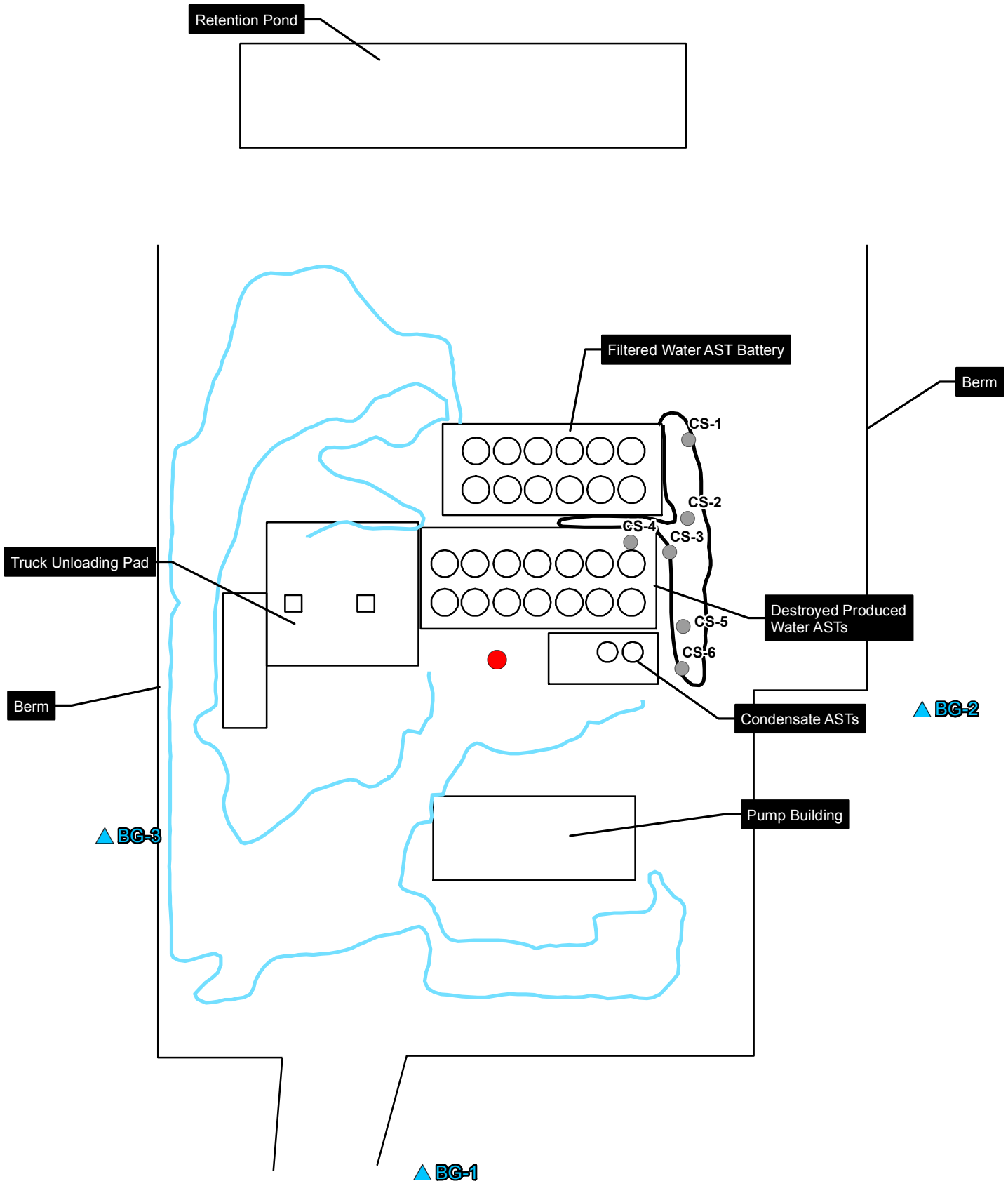
N

0 40 80

1 inch = 80 feet

OLSSON ASSOCIATES

F:\2016\1001-1500\016-1077\40-Design\Quality Control\GIS\16-06-24_ENVA_Wildhorse Maps.mxd User: jfriesen



Legend

- Confirmation Soil Sample
- Background Soil Sample Location
- Lightning Rod
- Crude Oil Release
- Produced Water Release

Site Layout
Tallgrass/BNN Energy
Wildhorse 16-13L SWD Release
Emergency Response
Crude Oil Spill Confirmation Samples
Weld County, Colorado
Olsson Project # 016-1077

N

0 40 80

1 inch = 80 feet

OLSSON ASSOCIATES

F:\2016\1001-1500\016-1077\40-Design\Quality Control\GIS\16-06-24_ENVA_Wildhorse Maps.mxd User: jfriesen

TABLE 1
Summary Table - Produced Water Site Characterization Soil Sample Results
BNN Western - Wildhorse 16-33L SWD
Produced Water Release - Emergency Response

Sample ID	Date	pH (s.u.)	Specific Conductivity (mmohs/cm)	Calcium (mg/l)	Magnesium (mg/l)	Sodium (mg/l)	SAR	Comments
COGCC T910-1		6 to 9	< 4 mmohs/cm or 2x background (< 2 to < 4 mmohs/cm)	N/A	N/A	N/A	< 12	
SS1 0-3"	5/11/2016	8.83	**8.800**	384	61.9	1140	**14.2**	Southwest corner; Surficial
SS-2 0-3"	5/11/2016	8.59	**9.370**	405	64.9	1350	**16.4**	West, Southwest; Surficial
SS-3 0-3"	5/11/2016	**9.08**	**7.730**	156	25.4	1270	**24.8**	West - Truck loadout pad, Surficial
SS-3D 4-5"	5/11/2016	8.91	0.804	68.0	11.5	68.8	2.03	West - Truck loadout pad, Depth of 4 to 5 inches
SS-4 0-3"	5/11/2016	8.87	**4.360**	99.3	17.8	660	**16.0**	West-Northwest, Drive Area - Surficial
SS-5 0-3"	5/11/2016	**9.13**	**8.040**	87.7	14.7	1450	**37.7**	Northwest, Drive Area - Surficial
SS-6 0-3"	5/11/2016	**9.07**	3.540	20.9	3.03	612	**33.1**	North, Drive Area - Surficial
SS-6D 4-5"	5/11/2016	8.49	2.430	188	41.7	159	2.73	North, Drive Area - Depth of 4 to 5 inches
SS-7 0-3"	5/11/2016	**9.34**	2.030	79.6	13.9	247	6.71	North-Northeast, FW AST Tank Battery - Surficial
SS-8 0-3"	5/11/2016	**9.47**	**4.040**	24.8	3.31	699	**35.0**	North-Northeast, PW AST Tank Battery - Surficial
SS-9 0-3"	5/11/2016	**9.61**	**7.470**	36.8	5.52	1370	**55.6**	Southeast, PW Tank Battery/Lightning Rod - Surficial
SS-10 0-3"	5/11/2016	**9.48**	**7.830**	40.7	6.02	1460	**56.5**	Southeast, PW TB/Pump House - Surficial
SS-10D 4-5"	5/11/2016	8.70	3.890	97.6	16.2	617	**15.2**	Southeast, PW TB/Pump House - Depth 4 to 5 inches
SS-11 0-3"	5/11/2016	**9.27**	**4.380**	192	29.9	620	11.0	East-Southeast, Condensate ASTs [2] - Surficial
SS-12 0-3"	5/11/2016	8.38	**10.000**	445	62.1	1600	**18.8**	East-Northeast, Condensate ASTs [2] - Surficial
SS-13 0-3"	5/11/2016	8.77	**8.050**	153	25.5	1480	**29.2**	South-Southeast, Pump House NW - Surficial
SS-14 0-3"	5/11/2016	**9.26**	**8.510**	74.1	11.2	1540	**44.0**	South-Southeast, Pump House SW - Surficial
SS-15 0-3"	5/11/2016	8.73	**9.030**	222	28.8	1640	**27.5**	South-Southwest SW Corner, Surficial
SS-15D 4-6"	5/11/2016	8.40	0.980	108	11.3	44.1	1.08	South-Southwest SW Corner, Depth of 4 to 6 inches
BG-1	5/11/2016	8.77	0.160	28.6	2.48	6.22	0.299	Background - South, Southeast of Wildhorse SWD
BG-2	5/11/2016	8.65	0.287	41.8	4.00	12.2	0.482	Background - East of Wildhorse SWD Facility/Fence
BG-3	5/11/2016	8.38	0.237	34.6	7.91	12.1	0.482	Background - West of Wildhorse SWD Facility/Fence
SS-16 0-3"	5/11/2016	8.70	**4.540**	191	32.6	618	10.9	South of Pump Bldg, Center - Surficial

Notes:

Values shown in bold font are above the Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 concentrations or levels.

pH (s.u.) measure of soil acidity (< 7) or alkalinity (> 7) with pH reported in standard units. The COGCC Table 910-1 range for soil pH is from 6 to 9 s.u.

According to the NRCS - Weld County Soil Survey, Northern Part, the site soils are characterized by the Otero silty loams and the Epping silty loam

The surficial horizon of these soils typically have a salinity of < 2 millimohs per centimeter (mmohs/cm).

mg/l - milligrams per liter

N/A - Not Applicable. The COGCC Table 910-1 does not list cleanup levels or concentrations for calcium, magnesium, or sodium, but does have a cleanup level for sodium adsorption ratio (SAR) which is calculated based on a ratio of calcium and magnesium to sodium.

These parameters are based on agricultural values that could affect plant growth.

$$SAR = \frac{Na^{+}}{SQRT\ 1/2(Ca^{2+} + Mg^{2+})}$$

TABLE 2
Summary Table - Crude Oil Spill Confirmation Soil Sample Results
BNN Western - Wildhorse 16-33L SWD
Crude Oil Release - Emergency Response

Sample ID	Date	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	Comments
COGCC T910-1		**0.17**	**85**	**100**	**175**	**500**	**500**	
CSS-1	6/9/2016	< 0.0013	< 0.0025	< 0.0025	< 0.0027	< 0.250	< 13	East of NE Corner of Filtered Water Secondary Containment
CSS-2	6/9/2016	< 0.0012	< 0.0024	< 0.0024	< 0.0026	< 0.240	< 12	Near SE Corner of Filtered Water Secondary Containment
CSS-3	6/9/2016	< 0.0012	< 0.0024	< 0.0024	< 0.0026	< 0.240	182	South - Near SE Corner of Filtered Water Secondary Containment
CSS-4	6/9/2016	< 0.0014	< 0.0027	< 0.0027	< 0.0029	< 0.270	< 14	West of SE Corner of Containment /Second Filtered Water AST
CSS-5	6/9/2016	< 0.0012	< 0.0024	< 0.0024	< 0.0025	< 0.240	171	East of NE Corner of Former Produced Water Secondary Containment
CSS-6	6/9/2016	< 0.0013	< 0.0025	< 0.0025	< 0.0026	< 0.250	< 12	East of SE Corner of Former Crude Oil Secondary Containment

Notes:
< - Analyte was not detected at or above the laboratory reporting limit
mg/kg - milligrams per kilogram
BTEX - Benzene, Toluene, Ethylbenzene, Xylenes (EPA Method 8260)
GRO - Gasoline Range Organics
DRO - Diesel Range Organics

ATTACHMENT B
COLORADO OIL AND GAS CONSERVATION COMMISSION FORMS

FORM 19 Rev 8/13

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203
Phone: (303) 894-2100 Fax: (303) 894-2109

Document Number: 401043131
Date Received: 05/07/2016

Spill report taken by:

Spill/Release Point ID:

SPILL/RELEASE REPORT (INITIAL)

This form is to be submitted by the party responsible for the oil and gas spill or release. Any spill or release which may impact waters of the State must be reported as soon as practicable; any spill over 20 bbls must be reported within 24 hours and all spills over five bbls must be reported within ten days. Submit a Site Investigation and Remediation Workplan (Form 27) when requested by the Director.

OPERATOR INFORMATON

Name of Operator: BNN WESTERN LLC Operator No: 10608

Address: 370 VAN GORDON STREET

City: LAKEWOOD State: CO Zip: 80228

Contact Person: Craig Meis

Phone Numbers

Phone: (303) 7633442

Mobile: (970) 2613567

Email: craig.meis@tallgrassenergylp.com

INITIAL SPILL/RELEASE REPORT

Initial Spill/Release Report Doc# 401043131

Initial Report Date: 05/07/2016 Date of Discovery: 05/06/2016 Spill Type: Recent Spill

Spill/Release Point Location:

Locationof Spill/Release: QTRQTR NWSW SEC 16 TWP 9N RNG 59W MERIDIAN 6

Latitude: 40.748568 Longitude: -103.990383

`Municipality (if within municipal boundaries): County: WELD

Reference Location:

Facility Type: OTHER ☒ Facility/Location ID No 159962

☐ No Existing Facility or Location ID No.

☐ Well API No. (Only if the reference facility is well) 05- -

Fluid(s) Spilled/Released (please answer Yes/No):

Was one (1) barrel or more spilled outside of berms or secondary containment? Yes

*Secondary containment, **including walls & floor regardless of construction material**, must be sufficiently impervious to contain any discharge from primary containment until cleanup occurs.*

Were Five (5) barrels or more spilled? Yes

Estimated Total Spill Volume: use same ranges as others for values

Estimated Oil Spill Volume(bbl): >=100 Estimated Condensate Spill Volume(bbl): 0

Estimated Flow Back Fluid Spill Volume(bbl): 0 Estimated Produced Water Spill Volume(bbl): >=100

Estimated Other E&P Waste Spill Volume(bbl): 0 Estimated Drilling Fluid Spill Volume(bbl): 0

Specify:

Land Use:

Current Land Use: NON-CROP LAND Other(Specify): Rangeland

Weather Condition: Rain and Lightning

Surface Owner: FEE Other(Specify): Wade and Todd Castor

Check if impacted or threatened by spill/Release (please answer Yes/No to all that apply):

Waters of the State ☐ Residence/Occupied Structure ☐ Livestock ☐ Public Byway ☐ Surface Water Supply Area ☐

As defined in COGCC 100-Series Rules

Describe what is known about the spill/release event (what happened -- including how it was stopped, contained, and recovered):

At ~11pm on 5/6/16 lightning struck the Wildhorse SWD tank battery. Site was isolated, secured and monitored by local first responders and BNN Field Operations personnel till fire subsided. No fire or liquids left fenced perimeter of site or pad. Free liquid is being collected via vac trucks.

List Agencies and Other Parties Notified:

OTHER NOTIFICATIONS

Date	Agency/Party	Contact	Phone	Response
5/7/2016	Weld County Commissioner	Barb Kirkmeyer	970-866-4988	Email notification sent. Read receipt received.
5/7/2016	Landowner	Wade and Todd Castor	970-768-0363	Verbally notified. No concerns.
5/7/2016	Adjacent Landowner	Timbro Ranch and Cattle	303-917-2732	Verbally notified. No concerns.

OPERATOR COMMENTS:

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: _____ Print Name: Craig Meis

Title: VP EHS Date: 05/07/2016 Email: craig.meis@tallgrassenergylp.com

COA Type	Description

Attachment Check List

Att Doc Num	Name

Total Attach: 0 Files

General Comments

User Group	Comment	Comment Date

Total: 0 comment(s)

FORM 19 Rev 8/13

State of Colorado
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203
Phone: (303) 894-2100 Fax: (303) 894-2109

Document Number: 401048444
Date Received: 05/16/2016

Spill report taken by: ALLISON, RICK

Spill/Release Point ID: 445727

SPILL/RELEASE REPORT (SUPPLEMENTAL)

This form is to be submitted by the party responsible for the oil and gas spill or release. Any spill or release which may impact waters of the State must be reported as soon as practicable; any spill over 20 bbls must be reported within 24 hours and all spills over five bbls must be reported within ten days. Submit a Site Investigation and Remediation Workplan (Form 27) when requested by the Director.

OPERATOR INFORMATON

Name of Operator: BNN WESTERN LLC Operator No: 10608
Address: 370 VAN GORDON STREET
City: LAKEWOOD State: CO Zip: 80228
Contact Person: Craig Meis

Phone Numbers
Phone: (303) 7633442
Mobile: (970) 2613567
Email: craig.meis@tallgrassenergylp.com

INITIAL SPILL/RELEASE REPORT

Initial Spill/Release Report Doc# 401043131

Initial Report Date: 05/07/2016 Date of Discovery: 05/06/2016 Spill Type: Recent Spill

Spill/Release Point Location:

Locationof Spill/Release: QTRQTR NWSW SEC 16 TWP 9N RNG 59W MERIDIAN 6
Latitude: 40.748568 Longitude: -103.990383
`Municipality (if within municipal boundaries): County: WELD

Reference Location:

Facility Type: OTHER ☒ Facility/Location ID No 159962
☐ No Existing Facility or Location ID No.
☐ Well API No. (Only if the reference facility is well) 05- -

Fluid(s) Spilled/Released (please answer Yes/No):

Was one (1) barrel or more spilled outside of berms or secondary containment? Yes

*Secondary containment, **including walls & floor regardless of construction material**, must be sufficiently impervious to contain any discharge from primary containment until cleanup occurs.*

Were Five (5) barrels or more spilled? Yes

Estimated Total Spill Volume: use same ranges as others for values

Estimated Oil Spill Volume(bbl): >=100 Estimated Condensate Spill Volume(bbl): 0
Estimated Flow Back Fluid Spill Volume(bbl): 0 Estimated Produced Water Spill Volume(bbl): >=100
Estimated Other E&P Waste Spill Volume(bbl): 0 Estimated Drilling Fluid Spill Volume(bbl): 0
Specify:

Land Use:

Current Land Use: NON-CROP LAND Other(Specify): Rangeland
Weather Condition: Rain and Lightning
Surface Owner: FEE Other(Specify): Wade and Todd Castor

Check if impacted or threatened by spill/Release (please answer Yes/No to all that apply):

Waters of the State ☐ Residence/Occupied Structure ☐ Livestock ☐ Public Byway ☐ Surface Water Supply Area ☐
As defined in COGCC 100-Series Rules

Describe what is known about the spill/release event (what happened -- including how it was stopped, contained, and recovered):

At ~11pm on 5/6/16 lightning struck the Wildhorse SWD tank battery. Site was isolated, secured and monitored by local first responders and BNN Field Operations personnel till fire subsided. No fire or liquids left fenced perimeter of site or pad. Free liquid is being collected via vac trucks.

List Agencies and Other Parties Notified:

OTHER NOTIFICATIONS

Date	Agency/Party	Contact	Phone	Response
5/7/2016	Weld County Commissioner	Barb Kirkmeyer	970-866-4988	Email notification sent. Read receipt received.
5/7/2016	Landowner	Wade and Todd Castor	970-768-0363	Verbally notified. No concerns.
5/7/2016	Adjacent Landowner	Timbro Ranch and Cattle	303-917-2732	Verbally notified. No concerns.

SPILL/RELEASE DETAIL REPORTS

#1 Supplemental Report Date: 05/16/2016

FLUIDS	BBL's SPILLED	BBL's RECOVERED	Unknown
OIL	950	1	☐
CONDENSATE	0	0	☐
PRODUCED WATER	3005	370	☐
DRILLING FLUID	0	0	☐
FLOW BACK FLUID	0	0	☐
OTHER E&P WASTE	0	0	☐

specify:

Was spill/release completely contained within berms or secondary containment? NO Was an Emergency Pit constructed? NO

*Secondary containment, **including walls & floor regardless of construction material**, must be sufficiently impervious to contain any discharge from primary containment until cleanup occurs.*

A Form 15 Pit Report shall be submitted within 30 calendar days after the construction of an emergency pit

Impacted Media (Check all that apply) ☒ Soil ☐ Groundwater ☐ Surface Water ☐ Dry Drainage Feature

Surface Area Impacted: Length of Impact (feet): Width of Impact (feet):

Depth of Impact (feet BGS): Depth of Impact (inches BGS):

How was extent determined?

The lateral extent of soil impacts was determined visually as observed by the presence of salt encrustation on drying soils and crude oil staining to surface soils. Soil samples were collected on Wednesday, May 11, 2016 in the areas of produced water impacts to access electrical conductance (EC), pH, sodium adsorption ratio (SAR) at the surface, and the extent of the vertical produced water impacts. The samples were submitted to the laboratory for rush turn-around on May 12. The results will be recieved in 3 to 5 days. Analytical results will be provided to the COGCC in an assessment report once lab results are received. No soil samples were collected from the areas with visible hydrocarbon impacts. Confirmation soil samples will be collected from these areas once hydrocarbon impacted soils are removed. A site diagram showing lateral extent of surface impacts and soil sample collection locations is attached.

Soil/Geology Description:

The site geology is characterized as the Tertiary White River Group (Symbol Twr) including the Brule Formation and overlying Arikaree Formation. The site soils at the Wildhorse 16 SWD facility consist of the Epping Silt Loam (Unit #27), occupying 0 - 9% slopes, over the southern 1/3 of the facility, and the Otero sandy loam (Unit #46) 0 - 3% slopes northern 2/3 of the facility.

Depth to Groundwater (feet BGS) 100 Number Water Wells within 1/2 mile radius: 0

If less than 1 mile, distance in feet to nearest

Water Well		None ☒	Surface Water		None ☒
Wetlands		None ☒	Springs		None ☒
Livestock	500	None ☐	Occupied Building		None ☒

Additional Spill Details Not Provided Above:

Liquid inside containment structure still to be collected due to on-going incident investigation. BBLs recovered will change and be updated as a result. Most of the oil is presumed to have burned off during the fire considering how little oil was seen on-site directly following the incident. Once incident investigation is complete and equipment removed from site, impacted soils will be excavated and removed till levels below Table 910-1 are achieved and confirmed via analysis of confirmation soil samples.

REQUEST FOR CLOSURE

Spill/Release Reports should be closed when impacts have been remediated or when further investigation and corrective actions will take place under an approved Form 27.

Basis for Closure: ☐ Corrective Actions Completed (documentation attached)

☐ Work proceeding under an approved Form 27

Form 27 Remediation Project No: _____

OPERATOR COMMENTS:

I hereby certify all statements made in this form are to the best of my knowledge true, correct, and complete.

Signed: _____ Print Name: Craig Meis

Title: VP EHS Date: 05/16/2016 Email: craig.meis@tallgrassenergylp.com

COA Type	Description

Attachment Check List

Att Doc Num	Name
401048444	FORM 19 SUBMITTED
401048459	SITE MAP
401048460	SITE MAP
401048463	OTHER

Total Attach: 4 Files

General Comments

User Group	Comment	Comment Date

Total: 0 comment(s)

ATTACHMENT C
SITE PHOTOGRAPHS

	**Subject:** The produced water spill mixed with stormwater and fire-fighting water, from the tank battery fire and extended to the west and southwest side of the Site. Vacuum trucks were used to pump up the water before the afternoon thunder storms. The lightning rod is shown near the center of the photograph. **Date:** May 7, 2016 **View:** North
	**Subject:** A lightning strike on the evening of May 6, 2016 hit one of the 400-bbl capacity fiberglass ASTs containing produced water and resulted in an explosion and fire that destroyed the produced water tank battery. The tank battery is shown in the center of the photograph. **Date:** May 7, 2016 **View:** Northwest
	**Subject:** The produced water spill extended across the Site to the west and southwest. BNN had vacuum trucks pumping up the water to remove it before the afternoon thunderstorms. The lightning rod is shown near the center of the photo where the 12 produced water ASTs and two 700-bbl capacity gun barrel separators were located and destroyed by fire. The 12 filtered water ASTs are shown in the background. **Date:** May 7, 2016 **View:** Northeast

	**Subject:** The produced water tank battery was still burning on the afternoon of May 7, 2016. The produced water spill flowed to the west side of the Site. The lightning rod and the crude oil tanks are shown near the center of the photograph. **Date:** May 7, 2016 **View:** East
	**Subject:** Photograph shows the two 400-bbl steel ASTs containing crude oil and the piping on the southeast side of the produced water tank battery secondary containment. **Date:** May 7, 2016 **View:** North
	**Subject:** Photograph shows the extent of the produced water spill on the southwest side of the Site. **Date:** May 7, 2016 **View:** Southwest

Subject: Site characterization occurred at the same time as the incident inspection.

Date: May 11, 2016

View: Northeast

Subject: The crude oil spill was localized on the east side of the filtered water and produced water secondary containments.

Date: May 11, 2016

View: North-Northeast

Subject: Stained soils were present between the produced water tank battery and the filtered water tank battery secondary containments.

Date: May 11, 2016

View: East

Subject: The crude oil spill extended along the east side of the produced water tank battery secondary containment and crude oil AST secondary containment.

Date: May 11, 2016

View: South

Subject: The crude oil spill had extended to the north along the east side of the filtered water AST tank battery secondary containment. An earthen berm was constructed to contain the crude oil until it could be cleaned up.

Date: May 11, 2016

View: Southwest

Subject: The produced water spill had extended to the west to the truck loading/unloading pad and doghouses.

Date: May 11, 2016

View: Southwest

	**Subject:** Photograph shows the produced water spill area on the west side of the pump building. **Date:** May 11, 2016 **View:** East
	**Subject:** Photograph shows the piping and the crude oil tanks on the east side of the Site. An incident investigation was conducted at the same time as the site characterization. **Date:** May 11, 2016 **View:** West
	**Subject:** Photograph shows the northern extent of the produced water spill area on the northwest side of the Site. The orange pin flag in the center of the photo is for the SS-6 soil sample location. **Date:** May 11,2016 **View:** North

Subject: The crude oil was pumped out of the two 400-bbl steel tanks during the cleanup operations. BHI Energy crew was in the process of removing the damaged insulation and metal jacket from around the filtered water ASTs.

Date: June 9, 2016

View: North

Subject: A lined earthen containment had been constructed for stockpiling oily soil on the east side of the Site. The produced water containment had been removed.

Date: June 9, 2016

View: West

Subject: Standing crude oil spill and stained soil was removed. BHI Energy removed smaller stained areas using a track-mounted skid steer.

Date: June 9, 2016

View: North

	**Subject:** Photograph shows the location of crude oil spill confirmation soil sample CSS-1 (orange pin flag/shovel) on the northeast side of the filtered water AST tank battery. **Date:** June 9, 2016 **View:** Southwest
	**Subject:** Photograph shows the location of crude oil spill confirmation soil samples CSS-2 (orange pin flag) on the southeast side of the filtered water AST secondary containment, and CSS-3 (orange pin flag in front of excavator), and CSS-4 (orange pin flag near Kobota skid steer). **Date:** June 9, 2016 **View:** Southwest
	**Subject:** Photograph shows the location of confirmation soil sample CSS-5 (lower left hand corner). **Date:** June 9, 2016 **View:** East

	**Subject:** Photograph shows the location of crude oil spill confirmation soil sample CSS-6 following additional soil excavation. **Date:** June 9, 2016 **View:** South
	**Subject:** Photograph shows the soil stockpiles from the excavation of the produced water spill area and crude oil spill area. Roll offs used to contain debris from cleanup efforts are shown in the background. **Date:** June 9, 2016 **View:** South
	**Subject:** Stained soils and debris stockpile located near the crude oil ASTs prior to their removal and removal of the stained gravel and liner. **Date:** June 9, 2016 **View:** East

	**Subject:** Photograph shows the produced water spill area to the north of the pump building following removal of the crude oil ASTs and produced water AST containment. **Date:** June 21, 2016 **View:** Northeast
	**Subject:** Photograph shows the area of the crude oil AST and produced water AST batteries following cleanup and removal. **Date:** June 21, 2016 **View:** West
	**Subject:** The stained soil and crude oil had been excavated and removed. Some staining was observed around the piping stub. **Date:** June 21, 2016 **View:** Southwest

Subject: Photograph shows the crude oil spill area on the east side of the Site following cleanup. The lined containment of oily soils was still present pending removal.

Date: June 21, 2016

View: North

Subject: Photograph shows the produced water spill area on the southwest side of the Site.

Date: June 21, 2016

View: Southwest

Subject: Photograph shows the northern extent of the produced water spill area on the northwest side of the Site from the truck loading/unloading pad.

Date: June 21, 2016

View: North

ATTACHMENT D
PRODUCED WATER SPILL SITE CHARACTERIZATION LABORATORY REPORT

e-Hardcopy 2.0
Automated Report

Technical Report for

Olsson Associates - Denver

Tallgrass/BNN Wildhorse SWD Emergency Response

016-1077

SGS Accutest Job Number: D82580

Sampling Date: 05/11/16

Report to:

Olsson Associates
4690 Table Mountain Drive #200 Suite 200
Golden, CO 80403
jhix@olssonassociates.com

ATTN: James Hix

Total number of pages in report: **112**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Scott Heideman
Laboratory Director

Client Service contact: Renea Lewis 303-425-6021

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), LA (LA150028), TX (T104704511), WY
CO (CO00049), EPA 515.4 Provisional

Table of Contents

Table of Contents

Sample Summary

Olsson Associates - Denver

Job No: D82580

Tallgrass/BNN Wildhorse SWD Emergency Response
Project No: 016-1077

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D82580-1	05/11/16	12:15	JH	05/12/16	SO	Soil	SS1 0-3"
D82580-1A	05/11/16	12:15	JH	05/12/16	SO	Soil	SS1 0-3"
D82580-2	05/11/16	12:37	JH	05/12/16	SO	Soil	SS-2 0-3"
D82580-2A	05/11/16	12:37	JH	05/12/16	SO	Soil	SS-2 0-3"
D82580-3	05/11/16	12:42	JH	05/12/16	SO	Soil	SS-3 0-3"
D82580-3A	05/11/16	12:42	JH	05/12/16	SO	Soil	SS-3 0-3"
D82580-4	05/11/16	12:48	JH	05/12/16	SO	Soil	SS-3D
D82580-4A	05/11/16	12:48	JH	05/12/16	SO	Soil	SS-3D
D82580-5	05/11/16	12:56	JH	05/12/16	SO	Soil	SS-4 0-3"
D82580-5A	05/11/16	12:56	JH	05/12/16	SO	Soil	SS-4 0-3"
D82580-6	05/11/16	13:02	JH	05/12/16	SO	Soil	SS-5 0-3"
D82580-6A	05/11/16	13:02	JH	05/12/16	SO	Soil	SS-5 0-3"
D82580-7	05/11/16	13:08	JH	05/12/16	SO	Soil	SS-6 0-3"

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary
(continued)

Olsson Associates - Denver

Job No: D82580

Tallgrass/BNN Wildhorse SWD Emergency Response
Project No: 016-1077

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D82580-7A	05/11/16	13:08	JH	05/12/16	SO	Soil	SS-6 0-3"
D82580-8	05/11/16	13:13	JH	05/12/16	SO	Soil	SS-6D
D82580-8A	05/11/16	13:13	JH	05/12/16	SO	Soil	SS-6D
D82580-9	05/11/16	13:19	JH	05/12/16	SO	Soil	SS-7
D82580-9A	05/11/16	13:19	JH	05/12/16	SO	Soil	SS-7
D82580-10	05/11/16	13:23	JH	05/12/16	SO	Soil	SS-8
D82580-10A	05/11/16	13:23	JH	05/12/16	SO	Soil	SS-8
D82580-11	05/11/16	13:31	JH	05/12/16	SO	Soil	SS-9
D82580-11A	05/11/16	13:31	JH	05/12/16	SO	Soil	SS-9
D82580-12	05/11/16	13:37	JH	05/12/16	SO	Soil	SS-10
D82580-12A	05/11/16	13:37	JH	05/12/16	SO	Soil	SS-10
D82580-13	05/11/16	13:40	JH	05/12/16	SO	Soil	SS-10D
D82580-13A	05/11/16	13:40	JH	05/12/16	SO	Soil	SS-10D

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary
(continued)

Olsson Associates - Denver

Job No: D82580

Tallgrass/BNN Wildhorse SWD Emergency Response
Project No: 016-1077

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D82580-14	05/11/16	13:48	JH	05/12/16	SO	Soil	SS-11
D82580-14A	05/11/16	13:48	JH	05/12/16	SO	Soil	SS-11
D82580-15	05/11/16	13:52	JH	05/12/16	SO	Soil	SS-12
D82580-15A	05/11/16	13:52	JH	05/12/16	SO	Soil	SS-12
D82580-16	05/11/16	13:59	JH	05/12/16	SO	Soil	SS-13
D82580-16A	05/11/16	13:59	JH	05/12/16	SO	Soil	SS-13
D82580-17	05/11/16	14:03	JH	05/12/16	SO	Soil	SS-14
D82580-17A	05/11/16	14:03	JH	05/12/16	SO	Soil	SS-14
D82580-18	05/11/16	14:10	JH	05/12/16	SO	Soil	SS-15
D82580-18A	05/11/16	14:10	JH	05/12/16	SO	Soil	SS-15
D82580-19	05/11/16	14:17	JH	05/12/16	SO	Soil	SS-15D
D82580-19A	05/11/16	14:17	JH	05/12/16	SO	Soil	SS-15D
D82580-20	05/11/16	14:27	JH	05/12/16	SO	Soil	BG-1

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary
(continued)

Olsson Associates - Denver

Job No: D82580

Tallgrass/BNN Wildhorse SWD Emergency Response
Project No: 016-1077

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D82580-20A	05/11/16	14:27	JH	05/12/16	SO	Soil	BG-1
D82580-21	05/11/16	14:32	JH	05/12/16	SO	Soil	BG-2
D82580-21A	05/11/16	14:32	JH	05/12/16	SO	Soil	BG-2
D82580-22	05/11/16	14:42	JH	05/12/16	SO	Soil	BG-3
D82580-22A	05/11/16	14:42	JH	05/12/16	SO	Soil	BG-3
D82580-23	05/11/16	14:53	JH	05/12/16	SO	Soil	SS-16
D82580-23A	05/11/16	14:53	JH	05/12/16	SO	Soil	SS-16

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Olsson Associates - Denver	**Job No**	D82580
Site:	Tallgrass/BNN Wildhorse SWD Emergency Response	**Report Date**	5/17/2016 4:57:07 PM

On 05/12/2016, 23 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 3.9 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D82580 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Metals By Method SW846 6010C

Matrix: AQ **Batch ID:** MP18705

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D82580-8AMS, D82580-8AMSD, D82580-8ASDL were used as the QC samples for the metals analysis.

Matrix: AQ **Batch ID:** MP18706

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D82580-13AMS, D82580-13AMSD, D82580-13ASDL were used as the QC samples for the metals analysis.

Wet Chemistry By Method SM2540G-2011 M

Matrix: SO **Batch ID:** GN34469

- The data for SM2540G-2011 M meets quality control requirements.

Matrix: SO **Batch ID:** GN34470

- The data for SM2540G-2011 M meets quality control requirements.

Wet Chemistry By Method SW846 9045D

Matrix: SO **Batch ID:** GN34483

- The following samples were run outside of holding time for method SW846 9045D: D82580-1, D82580-10, D82580-11, D82580-12, D82580-13, D82580-14, D82580-15, D82580-16, D82580-17, D82580-18, D82580-19, D82580-2, D82580-20, D82580-21, D82580-22, D82580-23, D82580-3, D82580-4, D82580-5, D82580-6, D82580-7, D82580-8, D82580-9

Wet Chemistry By Method USDA HANDBOOK 60

Matrix: SO **Batch ID:** MP18705

- D82580-1A through -23A for Sodium Adsorption Ratio: Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D82580
Account: Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response
Collected: 05/11/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D82580-1	**SS1 0-3"**					
Specific Conductivity		8800	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.83			su	SW846 9045D
D82580-1A	**SS1 0-3"**					
Calcium		384	2.0		mg/l	SW846 6010C
Magnesium		61.9	1.0		mg/l	SW846 6010C
Sodium		1140	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		14.2			ratio	USDA HANDBOOK 60
D82580-2	**SS-2 0-3"**					
Specific Conductivity		9370	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.59			su	SW846 9045D
D82580-2A	**SS-2 0-3"**					
Calcium		405	2.0		mg/l	SW846 6010C
Magnesium		64.9	1.0		mg/l	SW846 6010C
Sodium		1350	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		16.4			ratio	USDA HANDBOOK 60
D82580-3	**SS-3 0-3"**					
Specific Conductivity		7730	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.08			su	SW846 9045D
D82580-3A	**SS-3 0-3"**					
Calcium		156	2.0		mg/l	SW846 6010C
Magnesium		25.4	1.0		mg/l	SW846 6010C
Sodium		1270	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		24.8			ratio	USDA HANDBOOK 60
D82580-4	**SS-3D**					
Specific Conductivity		804	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.91			su	SW846 9045D
D82580-4A	**SS-3D**					
Calcium		68.0	2.0		mg/l	SW846 6010C
Magnesium		11.5	1.0		mg/l	SW846 6010C

Summary of Hits

Job Number: D82580
Account: Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response
Collected: 05/11/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Sodium		68.8	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		2.03			ratio	USDA HANDBOOK 60
D82580-5	**SS-4 0-3"**					
Specific Conductivity		4360	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.87			su	SW846 9045D
D82580-5A	**SS-4 0-3"**					
Calcium		99.3	2.0		mg/l	SW846 6010C
Magnesium		17.8	1.0		mg/l	SW846 6010C
Sodium		660	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		16.0			ratio	USDA HANDBOOK 60
D82580-6	**SS-5 0-3"**					
Specific Conductivity		8040	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.13			su	SW846 9045D
D82580-6A	**SS-5 0-3"**					
Calcium		87.7	2.0		mg/l	SW846 6010C
Magnesium		14.7	1.0		mg/l	SW846 6010C
Sodium		1450	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		37.7			ratio	USDA HANDBOOK 60
D82580-7	**SS-6 0-3"**					
Specific Conductivity		3540	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.07			su	SW846 9045D
D82580-7A	**SS-6 0-3"**					
Calcium		20.9	2.0		mg/l	SW846 6010C
Magnesium		3.03	1.0		mg/l	SW846 6010C
Sodium		612	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		33.1			ratio	USDA HANDBOOK 60
D82580-8	**SS-6D**					
Specific Conductivity		2430	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.49			su	SW846 9045D

Summary of Hits

Job Number: D82580
Account: Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response
Collected: 05/11/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D82580-8A	**SS-6D**					
Calcium		188	2.0		mg/l	SW846 6010C
Magnesium		41.7	1.0		mg/l	SW846 6010C
Sodium		159	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		2.73			ratio	USDA HANDBOOK 60
D82580-9	**SS-7**					
Specific Conductivity		2030	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.34			su	SW846 9045D
D82580-9A	**SS-7**					
Calcium		79.6	2.0		mg/l	SW846 6010C
Magnesium		13.9	1.0		mg/l	SW846 6010C
Sodium		247	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		6.71			ratio	USDA HANDBOOK 60
D82580-10	**SS-8**					
Specific Conductivity		4040	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.47			su	SW846 9045D
D82580-10A	**SS-8**					
Calcium		24.8	2.0		mg/l	SW846 6010C
Magnesium		3.31	1.0		mg/l	SW846 6010C
Sodium		699	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		35.0			ratio	USDA HANDBOOK 60
D82580-11	**SS-9**					
Specific Conductivity		7470	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.61			su	SW846 9045D
D82580-11A	**SS-9**					
Calcium		36.8	2.0		mg/l	SW846 6010C
Magnesium		5.52	1.0		mg/l	SW846 6010C
Sodium		1370	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		55.6			ratio	USDA HANDBOOK 60

Summary of Hits

Job Number: D82580
Account: Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response
Collected: 05/11/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D82580-12	**SS-10**					
Specific Conductivity		7830	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.48			su	SW846 9045D
D82580-12A	**SS-10**					
Calcium		40.7	2.0		mg/l	SW846 6010C
Magnesium		6.02	1.0		mg/l	SW846 6010C
Sodium		1460	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		56.5			ratio	USDA HANDBOOK 60
D82580-13	**SS-10D**					
Specific Conductivity		3890	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.70			su	SW846 9045D
D82580-13A	**SS-10D**					
Calcium		97.6	2.0		mg/l	SW846 6010C
Magnesium		16.2	1.0		mg/l	SW846 6010C
Sodium		617	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		15.2			ratio	USDA HANDBOOK 60
D82580-14	**SS-11**					
Specific Conductivity		4380	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.27			su	SW846 9045D
D82580-14A	**SS-11**					
Calcium		192	2.0		mg/l	SW846 6010C
Magnesium		29.9	1.0		mg/l	SW846 6010C
Sodium		620	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		11.0			ratio	USDA HANDBOOK 60
D82580-15	**SS-12**					
Specific Conductivity		10000	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.38			su	SW846 9045D
D82580-15A	**SS-12**					
Calcium		445	2.0		mg/l	SW846 6010C
Magnesium		62.1	1.0		mg/l	SW846 6010C

Summary of Hits

Job Number: D82580
Account: Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response
Collected: 05/11/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Sodium		1600	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		18.8			ratio	USDA HANDBOOK 60
D82580-16	**SS-13**					
Specific Conductivity		8050	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.77			su	SW846 9045D
D82580-16A	**SS-13**					
Calcium		153	2.0		mg/l	SW846 6010C
Magnesium		25.5	1.0		mg/l	SW846 6010C
Sodium		1480	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		29.2			ratio	USDA HANDBOOK 60
D82580-17	**SS-14**					
Specific Conductivity		8510	1.0		umhos/cm	SM 2510B-2011 MOD
pH		9.26			su	SW846 9045D
D82580-17A	**SS-14**					
Calcium		74.1	2.0		mg/l	SW846 6010C
Magnesium		11.2	1.0		mg/l	SW846 6010C
Sodium		1540	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		44.0			ratio	USDA HANDBOOK 60
D82580-18	**SS-15**					
Specific Conductivity		9030	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.73			su	SW846 9045D
D82580-18A	**SS-15**					
Calcium		222	2.0		mg/l	SW846 6010C
Magnesium		28.8	1.0		mg/l	SW846 6010C
Sodium		1640	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		27.5			ratio	USDA HANDBOOK 60
D82580-19	**SS-15D**					
Specific Conductivity		980	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.40			su	SW846 9045D

Summary of Hits

Job Number: D82580
Account: Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response
Collected: 05/11/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D82580-19A	**SS-15D**					
Calcium		108	2.0		mg/l	SW846 6010C
Magnesium		11.3	1.0		mg/l	SW846 6010C
Sodium		44.1	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		1.08			ratio	USDA HANDBOOK 60
D82580-20	**BG-1**					
Specific Conductivity		160	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.77			su	SW846 9045D
D82580-20A	**BG-1**					
Calcium		28.6	2.0		mg/l	SW846 6010C
Magnesium		2.48	1.0		mg/l	SW846 6010C
Sodium		6.22	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		0.299			ratio	USDA HANDBOOK 60
D82580-21	**BG-2**					
Specific Conductivity		287	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.65			su	SW846 9045D
D82580-21A	**BG-2**					
Calcium		41.8	2.0		mg/l	SW846 6010C
Magnesium		4.00	1.0		mg/l	SW846 6010C
Sodium		12.2	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		0.482			ratio	USDA HANDBOOK 60
D82580-22	**BG-3**					
Specific Conductivity		237	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.38			su	SW846 9045D
D82580-22A	**BG-3**					
Calcium		34.6	2.0		mg/l	SW846 6010C
Magnesium		7.91	1.0		mg/l	SW846 6010C
Sodium		12.1	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		0.482			ratio	USDA HANDBOOK 60

Summary of Hits

Job Number: D82580
Account: Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response
Collected: 05/11/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D82580-23	**SS-16**					
Specific Conductivity		4540	1.0		umhos/cm	SM 2510B-2011 MOD
pH		8.70			su	SW846 9045D
D82580-23A	**SS-16**					
Calcium		191	2.0		mg/l	SW846 6010C
Magnesium		32.6	1.0		mg/l	SW846 6010C
Sodium		618	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [a]		10.9			ratio	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	SS1 0-3"		
Lab Sample ID:	D82580-1	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	80.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	80.9		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	8800	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	8.83		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS1 0-3"		
Lab Sample ID:	D82580-1A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	80.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	384	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	61.9	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1140	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS1 0-3"		
Lab Sample ID:	D82580-1A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	80.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	14.2		ratio	1	05/13/16 15:48	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-2 0-3"		
Lab Sample ID:	D82580-2	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	78.1		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	9370	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	8.59		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-2 0-3"		
Lab Sample ID:	D82580-2A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	405	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	64.9	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1350	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-2 0-3"		
Lab Sample ID:	D82580-2A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	16.4		ratio	1	05/13/16 16:00	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-3 0-3"		
Lab Sample ID:	D82580-3	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	88.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	88.2		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	7730	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	9.08		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-3 0-3"		
Lab Sample ID:	D82580-3A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	88.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	156	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	25.4	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1270	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-3 0-3"		
Lab Sample ID:	D82580-3A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	88.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	24.8		ratio	1	05/13/16 16:12	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-3D		
Lab Sample ID:	D82580-4	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	85.2		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	804	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	8.91		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-3D		
Lab Sample ID:	D82580-4A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	68.0	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	11.5	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	68.8	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-3D		
Lab Sample ID:	D82580-4A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	2.03		ratio	1	05/13/16 16:24	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-4 0-3"		
Lab Sample ID:	D82580-5	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	85.1		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	4360	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	8.87		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-4 0-3"		
Lab Sample ID:	D82580-5A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	99.3	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	17.8	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	660	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-4 0-3"		
Lab Sample ID:	D82580-5A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	16.0		ratio	1	05/13/16 16:53	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-5 0-3"		
Lab Sample ID:	D82580-6	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	92.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	92.8		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	8040	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	9.13		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-5 0-3"		
Lab Sample ID:	D82580-6A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	92.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	87.7	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	14.7	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1450	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-5 0-3"		
Lab Sample ID:	D82580-6A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	92.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	37.7		ratio	1	05/13/16 17:00	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-6 0-3"		
Lab Sample ID:	D82580-7	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	82.7
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	82.7		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	3540	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	9.07		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-6 0-3"		
Lab Sample ID:	D82580-7A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	82.7
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	20.9	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	3.03	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	612	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-6 0-3"		
Lab Sample ID:	D82580-7A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	82.7
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	33.1		ratio	1	05/13/16 17:12	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-6D		
Lab Sample ID:	D82580-8	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	82.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	82.2		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	2430	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	8.49		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-6D		
Lab Sample ID:	D82580-8A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	82.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	188	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	41.7	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	159	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-6D		
Lab Sample ID:	D82580-8A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	82.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	2.73		ratio	1	05/13/16 15:20	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-7		
Lab Sample ID:	D82580-9	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	86.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	86.9		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	2030	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	9.34		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-7		
Lab Sample ID:	D82580-9A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	86.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	79.6	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	13.9	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	247	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-7		
Lab Sample ID:	D82580-9A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	86.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	6.71		ratio	1	05/13/16 17:19	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-8		
Lab Sample ID:	D82580-10	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	85.8		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	4040	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	9.47		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-8		
Lab Sample ID:	D82580-10A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	24.8	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	3.31	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	699	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-8		
Lab Sample ID:	D82580-10A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	85.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	35.0		ratio	1	05/13/16 17:26	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-9		
Lab Sample ID:	D82580-11	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	83.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	83.2		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	7470	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	9.61		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-9		
Lab Sample ID:	D82580-11A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	83.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	36.8	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	5.52	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1370	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-9		
Lab Sample ID:	D82580-11A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	83.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	55.6		ratio	1	05/13/16 17:33	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-10		
Lab Sample ID:	D82580-12	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	87.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	87.9		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	7830	1.0	umhos/cm	1	05/13/16	JD	SM 2510B-2011 MOD
pH	9.48		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-10		
Lab Sample ID:	D82580-12A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	87.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	40.7	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	6.02	1.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1460	2.0	mg/l	1	05/13/16	05/13/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7310
(2) Prep QC Batch: MP18705

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-10		
Lab Sample ID:	D82580-12A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	87.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	56.5		ratio	1	05/13/16 17:45	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-10D		
Lab Sample ID:	D82580-13	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	89.0
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	89		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	3890	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.70		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-10D		
Lab Sample ID:	D82580-13A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	89.0
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	97.6	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	16.2	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	617	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-10D		
Lab Sample ID:	D82580-13A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	89.0
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	15.2		ratio	1	05/17/16 11:44	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-11		
Lab Sample ID:	D82580-14	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.6
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	84.6		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	4380	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	9.27		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-11		
Lab Sample ID:	D82580-14A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.6
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	192	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	29.9	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	620	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-11		
Lab Sample ID:	D82580-14A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.6
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	11.0		ratio	1	05/17/16 12:34	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-12		
Lab Sample ID:	D82580-15	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	80.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	80.5		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	10000	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.38		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-12		
Lab Sample ID:	D82580-15A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	80.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	445	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	62.1	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1600	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-12		
Lab Sample ID:	D82580-15A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	80.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	18.8		ratio	1	05/17/16 12:41	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-13		
Lab Sample ID:	D82580-16	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	91.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	91.2		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	8050	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.77		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-13		
Lab Sample ID:	D82580-16A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	91.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	153	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	25.5	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1480	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-13		
Lab Sample ID:	D82580-16A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	91.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	29.2		ratio	1	05/17/16 12:54	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-14		
Lab Sample ID:	D82580-17	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	84.5		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	8510	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	9.26		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-14		
Lab Sample ID:	D82580-17A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	74.1	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	11.2	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1540	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-14		
Lab Sample ID:	D82580-17A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	44.0		ratio	1	05/17/16 13:06	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-15		
Lab Sample ID:	D82580-18	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	78.9		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	9030	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.73		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-15		
Lab Sample ID:	D82580-18A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	222	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	28.8	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	1640	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-15		
Lab Sample ID:	D82580-18A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.9
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	27.5		ratio	1	05/17/16 13:18	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-15D		
Lab Sample ID:	D82580-19	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	77.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	77.8		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	980	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.40		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-15D		
Lab Sample ID:	D82580-19A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	77.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	108	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	11.3	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	44.1	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-15D		
Lab Sample ID:	D82580-19A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	77.8
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.08		ratio	1	05/17/16 13:30	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-1		
Lab Sample ID:	D82580-20	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	84.2		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	160	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.77		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-1		
Lab Sample ID:	D82580-20A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	28.6	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	2.48	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	6.22	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-1		
Lab Sample ID:	D82580-20A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	84.2
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.299		ratio	1	05/17/16 13:37	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-2		
Lab Sample ID:	D82580-21	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	78.1		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	287	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.65		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-2		
Lab Sample ID:	D82580-21A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	41.8	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	4.00	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	12.2	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-2		
Lab Sample ID:	D82580-21A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	78.1
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.482		ratio	1	05/17/16 14:07	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-3		
Lab Sample ID:	D82580-22	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	70.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	70.5		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	237	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.38		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-3		
Lab Sample ID:	D82580-22A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	70.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	34.6	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	7.91	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	12.1	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	BG-3		
Lab Sample ID:	D82580-22A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	70.5
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.482		ratio	1	05/17/16 14:15	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-16		
Lab Sample ID:	D82580-23	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	79.6
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
%solids							
Solids, Percent	79.6		%	1	05/12/16	SWT	SM2540G-2011 M
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	4540	1.0	umhos/cm	1	05/16/16	JD	SM 2510B-2011 MOD
pH	8.70		su	1	05/13/16 09:00	JF	SW846 9045D

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-16		
Lab Sample ID:	D82580-23A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	79.6
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	191	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	32.6	1.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	618	2.0	mg/l	1	05/16/16	05/17/16	AS	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA7314
(2) Prep QC Batch: MP18706

RL = Reporting Limit

Report of Analysis

Client Sample ID:	SS-16		
Lab Sample ID:	D82580-23A	**Date Sampled:**	05/11/16
Matrix:	SO - Soil	**Date Received:**	05/12/16
		Percent Solids:	79.6
Project:	Tallgrass/BNN Wildhorse SWD Emergency Response		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	10.9		ratio	1	05/17/16 14:22	AS	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

5

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

PAGE 1 OF 2

Accutest Laboratories Mountain States
4036 Youngfield Street Wheat Ridge, Co 80033
TEL. 303-425-6021 877-737-4521
FAX 303-425-6021

FED-EX Tracking # | Bottle Order Control # | Accutest Quote # | Accutest Job # D82580

Client / Reporting Information

Company Name: Olsson Associates
Street Address: 4690 Table Mountain Dr. #200
City: Golden State: CO Zip: 80403
Project Contact: James Hix E-mail: jhix@olssonassociates.com
Phone #: 303.237.2072 Fax #: 303.237.2659
Sampler(s) Name(s): James Hix Phone #: 303.589.1572

Project Information

Project Name: Tallgrass/BNN Wildhorse SWD Emergency Response
Street:
City:
Project#: 016-1077
Client PO#:
Project Manager: James Hix

Billing Information (if different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention: PO#:

Requested Analysis (see TEST CODE sheet): Electrical Conductivity, pH, SAR

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL- Sludge; SED-Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB-Field Blank; EB- Equipment Blank; RB- Rinse Blank; TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	Bisulfate	Electrical Conductivity	pH	SAR	LAB USE ONLY
	SS1 0-3"		05/11/16	12:15	JH	Soil	2										✓	✓	✓	01
	SS-2 0-3"		05/11/16	12:37	JH	Soil	2										✓	✓	✓	02
	SS-3 0-3"		05/11/16	12:42	JH	Soil	2										✓	✓	✓	03
	SS-3D		05/11/16	12:48	JH	Soil	2										✓	✓	✓	04
	SS-4 0-3"		05/11/16	12:56	JH	Soil	2										✓	✓	✓	05
	SS-5 0-3"		05/11/16	13:02	JH	Soil	2										✓	✓	✓	06
	SS-6 0-3"		05/11/16	13:08	JH	Soil	2										✓	✓	✓	07
	SS-6D		05/11/16	13:13	JH	Soil	2										✓	✓	✓	08
	SS-7		05/11/16	13:19	JH	Soil	2										✓	✓	✓	09
	SS-8		05/11/16	13:23	JH	Soil	2										✓	✓	✓	10
	SS-9		05/11/16	13:31	JH	Soil	2										✓	✓	✓	11
	SS-10		05/11/16	13:37	JH	Soil	2										✓	✓	✓	12

Turnaround Time (Business days)

- [ ] Std. 10 Business Days
- [ ] Std. 5 Business Days (By Contract only)
- [x] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [x] 1 Day EMERGENCY 24-Hr TAT JH

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] Commercial "B" +Narrative
- [ ] FULLT1 (Level 3+4)
- [ ] State Forms
- [ ] EDD Format
- [ ] PDF

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 James Hix	05/12/16 8:50	1 Jacob Pa... 5/12/16 08:50	2		2
3 Relinquished by Sampler:	Date Time:	3 Received By:	4 Relinquished By:	Date Time:	4 Received By:
5 Relinquished by:	Date Time:	5 Received By:	Custody Seal # HD	☒ Intact ☐ Not intact; Preserved where applicable ☒ T080	On Ice ☒; Cooler Temp. 3.9

D82580: Chain of Custody
Page 1 of 3

5.1
5

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

Accutest Laboratories Mountain States
4036 Youngfield Street Wheat Ridge, Co 80033
TEL. 303-425-6021 877-737-4521
FAX 303-425-6021

FED-EX Tracking #	Bottle Order Control #
Accutest Quote #	Accutest Job # D82580

Client / Reporting Information
Company Name: Olsson Associates
Street Address: 4690 Table Mountain Dr. #200
City: Golden State: CO Zip: 80403
Project Contact: James Hix E-mail: Jhix@olssonassociates.com
Phone #: 303.237.2072 Fax #: 303.237.2659
Sampler(s) Name(s): James Hix Phone #: 303.589.1572

Project Information
Project Name: Tallgrass/BNN Energy Wildhorse SWD Emergency Response
Street: CR 104
City: Keota, CO
Project#: 016-1077
Client PO#:
Project Manager: James Hix

Billing Information (If different from Report to)
Company Name:
Street Address:
City: State: Zip:
Attention: PO#:

Requested Analysis (see TEST CODE sheet): Electrical Conductivity; pH; SAR (Sodium Adsorption Ratio)

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL - Sludge; SED - Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB - Field Blank; EB - Equipment Blank; RB - Rinse Blank; TB - Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	Bisulfate	Electrical Conductivity	pH	SAR (Sodium Adsorption Ratio)	LAB USE ONLY
	SS-10D		05/11/16	13:40	JH	Soil	2										✓	✓	✓	13
	SS-11		05/11/16	13:48	JH	Soil	2										✓	✓	✓	14
	SS-12		05/11/16	13:52	JH	Soil	2										✓	✓	✓	15
	SS-13		05/11/16	13:59	JH	Soil	2										✓	✓	✓	16
	SS-14		05/11/16	14:03	JH	Soil	2										✓	✓	✓	17
	SS-15		05/11/16	14:10	JH	Soil	2										✓	✓	✓	18
	SS-15D		05/11/16	14:17	JH	Soil	2										✓	✓	✓	19
	BG-1		05/11/16	14:27	JH	Soil	2										✓	✓	✓	20
	BG-2		05/11/16	14:32	JH	Soil	2										✓	✓	✓	21
	BG-3		05/11/16	14:42	JH	Soil	2										✓	✓	✓	22
	SS-16		05/11/16	14:53	JH	Soil	2										✓	✓	✓	23

Turnaround Time (Business days)
- [ ] Std. 10 Business Days
- [ ] Std. 5 Business Days (By Contract only)
- [x] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [x] 1 Day EMERGENCY ~~24-Hr TAT~~ JH

Approved By (Accutest PM): / Date:

Emergency & Rush T/A data available VIA Lablink

Data Deliverable Information
- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] Commercial "B" +Narrative
- [ ] FULLT1 (Level 3+4)
- [ ] State Forms
- [ ] EDD Format
- [ ] PDF

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 James Hix	5/12/16 8:50	1 [signature] 5/12/16 0850	2		2
3		3	4		4
5		5	Custody Seal # HD	☒ Intact ☐ Not intact	Preserved where applicable ☒ On Ice ☒ Cooler Temp. T080 3.9

D82580: Chain of Custody
Page 2 of 3

SGS Accutest Sample Receipt Summary

Job Number: D82580 **Client:** OLSSON **Project:** TALLGRASS BNN WILDHORSE SWD EMERGEN

Date / Time Received: 5/12/2016 8:50:00 AM **Delivery Method:** **Airbill #'s:** hd

Cooler Temps (Initial/Adjusted): #1: (3.9/3.9);

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Cooler temp verification:	IR Gun;		
3. Cooler media:	Ice (Bag)		
4. No. Coolers:	1		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	☑
2. Trip Blank listed on COC:	☐		☐	☑
3. Samples preserved properly:	☑		☐	
4. VOCs headspace free:	☐		☐	☑

Comments

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

D82580: Chain of Custody
Page 3 of 3

Metals Analysis

6

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	65		
Antimony	150	11	44		
Arsenic	130	19	60		
Barium	50	1	2		
Beryllium	50	4.5	8		
Boron	250	4	18		
Cadmium	50	1	4		
Calcium	2000	12	50	41.5	<2000
Chromium	50	1.5	3.5		
Cobalt	25	2.5	6		
Copper	50	4	19		
Iron	350	7.5	35		
Lead	250	11	25		
Lithium	25	2	3.5		
Magnesium	1000	34	200	30.0	<1000
Manganese	25	2.5	4.5		
Molybdenum	50	2	18		
Nickel	150	2.5	14		
Phosphorus	500	75	170		
Potassium	5000	500	360		
Selenium	250	36	50		
Silicon	250	24	42		
Silver	150	1.5	3		
Sodium	2000	37	70	-180	<2000
Strontium	25	.05	1.5		
Thallium	50	9	40		
Tin	250	60	60		
Titanium	50	.5	14		
Uranium	250	15	22		
Vanadium	50	2	3		
Zinc	150	2	18		

Associated samples MP18705: D82580-1A, D82580-2A, D82580-3A, D82580-4A, D82580-5A, D82580-6A, D82580-7A, D82580-8A, D82580-9A, D82580-10A, D82580-11A, D82580-12A

Results < IDL are shown as zero for calculation purposes

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	RL	IDL	MDL	MB raw	final

(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	D82580-8A Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	188000	318000	125000	104.0	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	41700	167000	125000	100.2	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	159000	277000	125000	94.4	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP18705: D82580-1A, D82580-2A, D82580-3A, D82580-4A, D82580-5A, D82580-6A, D82580-7A, D82580-8A, D82580-9A, D82580-10A, D82580-11A, D82580-12A

Results < IDL are shown as zero for calculation purposes

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	D82580-8A Original MS	Spikelot ICPALL2	% Rec	QC Limits

(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	D82580-8A Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	188000	315000	125000	101.6	0.9	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	41700	168000	125000	101.0	0.6	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	159000	275000	125000	92.8	0.7	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP18705: D82580-1A, D82580-2A, D82580-3A, D82580-4A, D82580-5A, D82580-6A, D82580-7A, D82580-8A, D82580-9A, D82580-10A, D82580-11A, D82580-12A

Results < IDL are shown as zero for calculation purposes

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	D82580-8A Original MSD	Spikelot ICPALL2 % Rec	MSD RPD	QC Limit

(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	128000	125000	102.4	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	126000	125000	100.8	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	121000	125000	96.8	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP18705: D82580-1A, D82580-2A, D82580-3A, D82580-4A, D82580-5A, D82580-6A, D82580-7A, D82580-8A, D82580-9A, D82580-10A, D82580-11A, D82580-12A

Results < IDL are shown as zero for calculation purposes

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits

(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

Metal	D82580-8A Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	37600	36600	2.6	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	8330	8060	3.3	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	31700	30400	4.1	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP18705: D82580-1A, D82580-2A, D82580-3A, D82580-4A, D82580-5A, D82580-6A, D82580-7A, D82580-8A, D82580-9A, D82580-10A, D82580-11A, D82580-12A

Results < IDL are shown as zero for calculation purposes

SERIAL DILUTION RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18705
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/13/16

	D82580-8A		QC
Metal	Original SDL 1:5	%DIF	Limits

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	65		
Antimony	150	11	44		
Arsenic	130	19	60		
Barium	50	1	2		
Beryllium	50	4.5	8		
Boron	250	4	18		
Cadmium	50	1	4		
Calcium	2000	12	50	60.0	<2000
Chromium	50	1.5	3.5		
Cobalt	25	2.5	6		
Copper	50	4	19		
Iron	350	7.5	35		
Lead	250	11	25		
Lithium	25	2	3.5		
Magnesium	1000	34	200	88.5	<1000
Manganese	25	2.5	4.5		
Molybdenum	50	2	18		
Nickel	150	2.5	14		
Phosphorus	500	75	170		
Potassium	5000	500	360		
Selenium	250	36	50		
Silicon	250	24	42		
Silver	150	1.5	3		
Sodium	2000	37	70	397	<2000
Strontium	25	.05	1.5		
Thallium	50	9	40		
Tin	250	60	60		
Titanium	50	.5	14		
Uranium	250	15	22		
Vanadium	50	2	3		
Zinc	150	2	18		

Associated samples MP18706: D82580-13A, D82580-14A, D82580-15A, D82580-16A, D82580-17A, D82580-18A, D82580-19A, D82580-20A, D82580-21A, D82580-22A, D82580-23A

Results < IDL are shown as zero for calculation purposes

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	RL	IDL	MDL	MB raw	final

(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	D82580-13A Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	97600	227000	125000	103.5	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	16200	140000	125000	99.0	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	617000	721000	125000	83.2	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP18706: D82580-13A, D82580-14A, D82580-15A, D82580-16A, D82580-17A, D82580-18A, D82580-19A, D82580-20A, D82580-21A, D82580-22A, D82580-23A

Results < IDL are shown as zero for calculation purposes

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	D82580-13A Original MS	Spikelot ICPALL2	% Rec	QC Limits

(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	D82580-13A Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	97600	236000	125000	110.7	3.9	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	16200	143000	125000	101.4	2.1	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	617000	783000	125000	132.8(a)	8.2	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP18706: D82580-13A, D82580-14A, D82580-15A, D82580-16A, D82580-17A, D82580-18A, D82580-19A, D82580-20A, D82580-21A, D82580-22A, D82580-23A

Results < IDL are shown as zero for calculation purposes

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	D82580-13A Original MSD	Spikelot ICPALL2 % Rec	MSD RPD	QC Limit

(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	130000	125000	104.0	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	128000	125000	102.4	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	122000	125000	97.6	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP18706: D82580-13A, D82580-14A, D82580-15A, D82580-16A, D82580-17A, D82580-18A, D82580-19A, D82580-20A, D82580-21A, D82580-22A, D82580-23A

Results < IDL are shown as zero for calculation purposes

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits

(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

Metal	D82580-13A Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	19500	21100	8.3	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	3250	3550	9.2	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	123000	132000	7.3	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP18706: D82580-13A, D82580-14A, D82580-15A, D82580-16A, D82580-17A, D82580-18A, D82580-19A, D82580-20A, D82580-21A, D82580-22A, D82580-23A

Results < IDL are shown as zero for calculation purposes

SERIAL DILUTION RESULTS SUMMARY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

QC Batch ID: MP18706
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 05/16/16

	D82580-13A		QC
Metal	Original SDL 1:5	%DIF	Limits

(*) Outside of QC limits
(anr) Analyte not requested

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D82580
Account: COCSCOG - Olsson Associates - Denver
Project: Tallgrass/BNN Wildhorse SWD Emergency Response

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Specific Conductivity	GP17907/GN34481			umhos/cm	9989	9910	99.2	90-110%
Specific Conductivity	GP17924/GN34517			umhos/cm	9989	9700	97.1	90-110%
pH	GN34483			su	8.00	7.97	99.6	99.1-100.9%

Associated Samples:
Batch GN34483: D82580-1, D82580-2, D82580-3, D82580-4, D82580-5, D82580-6, D82580-7, D82580-8, D82580-9, D82580-10, D82580-11, D82580-12, D82580-13, D82580-14, D82580-15, D82580-16, D82580-17, D82580-18, D82580-19, D82580-20, D82580-21, D82580-22, D82580-23
Batch GP17907: D82580-1, D82580-2, D82580-3, D82580-4, D82580-5, D82580-6, D82580-7, D82580-8, D82580-9, D82580-10, D82580-11, D82580-12
Batch GP17924: D82580-13, D82580-14, D82580-15, D82580-16, D82580-17, D82580-18, D82580-19, D82580-20, D82580-21, D82580-22, D82580-23
(*) Outside of QC limits

ATTACHMENT E
CRUDE OIL CONFIRMATION SAMPLES LABORATORY REPORT

e-Hardcopy 2.0
Automated Report

Technical Report for

Olsson Associates - Denver

BNN Western, LLC Wildhorse SWD

SGS Accutest Job Number: D83523

Sampling Date: 06/09/16

Report to:

Olsson Associates
4690 Table Mountain Drive #200 Suite 200
Golden, CO 80403
jhix@olssonassociates.com

ATTN: James Hix

Total number of pages in report: 32

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Scott Heideman
Laboratory Director

Client Service contact: Renea Lewis 303-425-6021

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), LA (LA150028), TX (T104704511), WY
CO (CO00049)

Sections: 1 2 3 4 5 6 7

Table of Contents

Sample Summary

Olsson Associates - Denver

Job No: D83523

BNN Western, LLC Wildhorse SWD

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D83523-1	06/09/16	12:30	JH	06/10/16	SO	Soil	CSS-1
D83523-2	06/09/16	12:35	JH	06/10/16	SO	Soil	CSS-2
D83523-3	06/09/16	12:41	JH	06/10/16	SO	Soil	CSS-3
D83523-4	06/09/16	13:41	JH	06/10/16	SO	Soil	CSS-4
D83523-5	06/09/16	13:49	JH	06/10/16	SO	Soil	CSS-5
D83523-6	06/09/16	13:58	JH	06/10/16	SO	Soil	CSS-6

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Olsson Associates - Denver	**Job No**	D83523
Site:	BNN Western, LLC Wildhorse SWD	**Report Date**	6/17/2016 5:15:38 PM

On 06/10/2016, 6 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 4.3 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D83523 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260B

Matrix: SO **Batch ID:** V3V2125

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D83523-1MS, D83523-1MSD were used as the QC samples indicated.
- The matrix spike (MS) recovery(s) of Benzene, Ethylbenzene, Toluene, Xylene (total) are outside control limits. Outside control limits due to possible matrix interference.
- The matrix spike duplicate (MSD) recovery(s) of Ethylbenzene are outside control limits. Probable cause due to matrix interference.

Extractables by GC By Method SW846-8015B

Matrix: SO **Batch ID:** OP13670

- All samples were extractedand analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D83523-1MS, D83523-1MSD were used as the QC samples indicated.

Wet Chemistry By Method SM2540G-2011 M

Matrix: SO **Batch ID:** GN34840

- The data for SM2540G-2011 M meets quality control requirements.

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D83523
Account: Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD
Collected: 06/09/16

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D83523-1	**CSS-1**					
No hits reported in this sample.						
D83523-2	**CSS-2**					
No hits reported in this sample.						
D83523-3	**CSS-3**					
TPH-DRO (C10-C28)		182	12	11	mg/kg	SW846-8015B
D83523-4	**CSS-4**					
No hits reported in this sample.						
D83523-5	**CSS-5**					
TPH-DRO (C10-C28)		171	12	11	mg/kg	SW846-8015B
D83523-6	**CSS-6**					
No hits reported in this sample.						

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	CSS-1		
Lab Sample ID:	D83523-1	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846 8260B	**Percent Solids:**	79.9
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V37232.D	1	06/14/16	AJ	n/a	n/a	V3V2125
Run #2							

	Initial Weight
Run #1	4.95 g
Run #2	

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.3	0.63	ug/kg	
108-88-3	Toluene	ND	2.5	1.3	ug/kg	
100-41-4	Ethylbenzene	ND	2.5	0.63	ug/kg	
1330-20-7	Xylene (total)	ND	2.7	1.3	ug/kg	
	TPH-GRO (C6-C10)	ND	250	130	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		70-130%
2037-26-5	Toluene-D8	96%		64-130%
460-00-4	4-Bromofluorobenzene	104%		62-131%
17060-07-0	1,2-Dichloroethane-D4	107%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-1		
Lab Sample ID:	D83523-1	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846-8015B SW846 3546	**Percent Solids:**	79.9
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI39671.D	1	06/17/16	CH	06/14/16	OP13670	GFI1803
Run #2							

	Initial Weight	Final Volume
Run #1	20.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	13	12	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	84%		20-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-2		
Lab Sample ID:	D83523-2	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846 8260B	**Percent Solids:**	81.9
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V37237.D	1	06/14/16	AJ	n/a	n/a	V3V2125
Run #2							

	Initial Weight
Run #1	5.00 g
Run #2	

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.2	0.61	ug/kg	
108-88-3	Toluene	ND	2.4	1.2	ug/kg	
100-41-4	Ethylbenzene	ND	2.4	0.61	ug/kg	
1330-20-7	Xylene (total)	ND	2.6	1.2	ug/kg	
	TPH-GRO (C6-C10)	ND	240	120	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	105%		70-130%
2037-26-5	Toluene-D8	96%		64-130%
460-00-4	4-Bromofluorobenzene	102%		62-131%
17060-07-0	1,2-Dichloroethane-D4	105%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-2		
Lab Sample ID:	D83523-2	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846-8015B SW846 3546	**Percent Solids:**	81.9
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI39619.D	1	06/16/16	CH	06/14/16	OP13670	GFI1799
Run #2							

	Initial Weight	Final Volume
Run #1	20.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	12	12	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	83%		20-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-3		
Lab Sample ID:	D83523-3	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846 8260B	**Percent Solids:**	82.7
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V37238.D	1	06/14/16	AJ	n/a	n/a	V3V2125
Run #2							

	Initial Weight
Run #1	4.95 g
Run #2	

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.2	0.61	ug/kg	
108-88-3	Toluene	ND	2.4	1.2	ug/kg	
100-41-4	Ethylbenzene	ND	2.4	0.61	ug/kg	
1330-20-7	Xylene (total)	ND	2.6	1.2	ug/kg	
	TPH-GRO (C6-C10)	ND	240	120	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		70-130%
2037-26-5	Toluene-D8	97%		64-130%
460-00-4	4-Bromofluorobenzene	99%		62-131%
17060-07-0	1,2-Dichloroethane-D4	106%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-3		
Lab Sample ID:	D83523-3	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846-8015B SW846 3546	**Percent Solids:**	82.7
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI39685.D	1	06/17/16	CH	06/14/16	OP13670	GFI1803
Run #2							

	Initial Weight	Final Volume
Run #1	20.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	182	12	11	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	96%		20-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-4		
Lab Sample ID:	D83523-4	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846 8260B	**Percent Solids:**	73.9
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V37239.D	1	06/14/16	AJ	n/a	n/a	V3V2125
Run #2							

	Initial Weight
Run #1	4.97 g
Run #2	

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.4	0.68	ug/kg	
108-88-3	Toluene	ND	2.7	1.4	ug/kg	
100-41-4	Ethylbenzene	ND	2.7	0.68	ug/kg	
1330-20-7	Xylene (total)	ND	2.9	1.4	ug/kg	
	TPH-GRO (C6-C10)	ND	270	140	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		70-130%
2037-26-5	Toluene-D8	96%		64-130%
460-00-4	4-Bromofluorobenzene	99%		62-131%
17060-07-0	1,2-Dichloroethane-D4	102%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CSS-4
Lab Sample ID: D83523-4
Matrix: SO - Soil
Method: SW846-8015B SW846 3546
Project: BNN Western, LLC Wildhorse SWD

Date Sampled: 06/09/16
Date Received: 06/10/16
Percent Solids: 73.9

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI39623.D	1	06/16/16	CH	06/14/16	OP13670	GFI1799
Run #2							

	Initial Weight	Final Volume
Run #1	20.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	14	13	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	89%		20-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-5		
Lab Sample ID:	D83523-5	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846 8260B	**Percent Solids:**	84.4
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V37240.D	1	06/14/16	AJ	n/a	n/a	V3V2125
Run #2							

	Initial Weight
Run #1	5.01 g
Run #2	

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.2	0.59	ug/kg	
108-88-3	Toluene	ND	2.4	1.2	ug/kg	
100-41-4	Ethylbenzene	ND	2.4	0.59	ug/kg	
1330-20-7	Xylene (total)	ND	2.5	1.2	ug/kg	
	TPH-GRO (C6-C10)	ND	240	120	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		70-130%
2037-26-5	Toluene-D8	97%		64-130%
460-00-4	4-Bromofluorobenzene	100%		62-131%
17060-07-0	1,2-Dichloroethane-D4	103%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-5		
Lab Sample ID:	D83523-5	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846-8015B SW846 3546	**Percent Solids:**	84.4
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI39687.D	1	06/17/16	CH	06/14/16	OP13670	GFI1803
Run #2							

	Initial Weight	Final Volume
Run #1	20.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	171	12	11	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	87%		20-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-6		
Lab Sample ID:	D83523-6	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846 8260B	**Percent Solids:**	80.2
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3V37241.D	1	06/14/16	AJ	n/a	n/a	V3V2125
Run #2							

	Initial Weight
Run #1	4.96 g
Run #2	

Purgeable Aromatics+ GRO

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.3	0.63	ug/kg	
108-88-3	Toluene	ND	2.5	1.3	ug/kg	
100-41-4	Ethylbenzene	ND	2.5	0.63	ug/kg	
1330-20-7	Xylene (total)	ND	2.6	1.3	ug/kg	
	TPH-GRO (C6-C10)	ND	250	130	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		70-130%
2037-26-5	Toluene-D8	97%		64-130%
460-00-4	4-Bromofluorobenzene	101%		62-131%
17060-07-0	1,2-Dichloroethane-D4	102%		70-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CSS-6		
Lab Sample ID:	D83523-6	**Date Sampled:**	06/09/16
Matrix:	SO - Soil	**Date Received:**	06/10/16
Method:	SW846-8015B SW846 3546	**Percent Solids:**	80.2
Project:	BNN Western, LLC Wildhorse SWD		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FI39627.D	1	06/16/16	CH	06/14/16	OP13670	GFI1799
Run #2							

	Initial Weight	Final Volume
Run #1	20.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	12	12	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	90%		20-130%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS ACCUTEST

CHAIN OF CUSTODY

PAGE ___ OF ___

4036 Youngfield Street, Wheat Ridge, CO 80033
TEL. 303-425-6021 FAX: 303-425-6854
www.accutest.com

FED-EX Tracking #:
Bottle Order Control #:
SGS Accutest Quote #:
SGS Accutest Job #: D83523

Client / Reporting Information
Company Name: Olsson Associates
Street Address: 4690 Table Mountain Dr.
City: Golden, CO 80403
Project Contact: James Hix
Phone #: 303.237.2072
Sampler(s) Name(s): James Hix

Project Information
Project Name: BNN Western, LLC - Wildhorse SWD
Street: WCR 104
City: Keota State: CO
Project #: 016-1077 100 100001
Client Purchase Order #:
Project Manager: James Hix

Billing Information (if different from Report to)
Company Name: Same
Street Address:
City:
Attention:

Requested Analysis (see TEST CODE sheet): BTEX (8260), GRO (8260), DRO (M.8015)

Matrix Codes
DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
SED - Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB - Field Blank
EB - Equipment Blank
RB - Rinse Blank
TB - Trip Blank

SGS Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	BTEX (8260)	GRO (8260)	DRO (M.8015)	LAB USE ONLY
	CSS-1		06/09/16	1230	JH	S	2					✓				✓	✓	✓	01
	CSS-2		06/09/16	1235	JH	S	2					✓				✓	✓	✓	02
	CSS-3		06/09/16	1241	JH	S	2					✓				✓	✓	✓	03
	CSS-4		06/09/16	1341	JH	S	2					✓				✓	✓	✓	04
	CSS-5		06/09/16	1349	JH	S	2					✓				✓	✓	✓	05
	CSS-6		06/09/16	1358	JH	S	2					✓				✓	✓	✓	06

Turnaround Time (Business days)
- [ ] Std. 15 Business Days
- [ ] Std. 10 Business Days
- [x] 5 Day RUSH
- [ ] 3 Day Emergency
- [ ] 2 Day Emergency
- [ ] 1 Day Emergency
- [ ]

Emergency & Rush T/A data available VIA Lablink

Approved By (SGS Accutest PM): / Date:

Data Deliverable Information
- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] COMMBN
- [ ] COMMBN+
- [ ]
- [ ] State Forms Required
- [ ] Send Forms to State
- [ ] Report by Fax
- [ ] Report by PDF
- [ ] EDD Format

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
Commercial BN = Results/QC/Narrative (+ = chromatograms)

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 James Hix	06/10/16 14:55	1 [signature]	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 3	Custody Seal # HD	☐ Intact ☐ Not intact	Preserved where applicable ☐ On Ice ☐ Cooler Temp. 4.3

QA 065-00 Rev. 1 1/21/2016

5.1
5

D83523: Chain of Custody
Page 1 of 2

SGS Accutest Sample Receipt Summary

Job Number: D83523 **Client:** OLSSON **Project:** BNN

Date / Time Received: 6/10/2016 2:55:00 PM **Delivery Method:** **Airbill #'s:** HD

Cooler Temps (Initial/Adjusted): #1: (4.3/4.3);

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Cooler temp verification:	IR Gun;		
3. Cooler media:	Ice (Bag)		
4. No. Coolers:	1		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	☑
2. Trip Blank listed on COC:	☐		☐	☑
3. Samples preserved properly:	☑		☐	
4. VOCs headspace free:	☐		☐	☑

Comments

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

GC/MS Volatiles

6

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V2125-MB	3V37228.D	1	06/14/16	AJ	n/a	n/a	V3V2125

The QC reported here applies to the following samples: **Method:** SW846 8260B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.50	ug/kg	
100-41-4	Ethylbenzene	ND	2.0	0.50	ug/kg	
108-88-3	Toluene	ND	2.0	1.0	ug/kg	
1330-20-7	Xylene (total)	ND	2.1	1.0	ug/kg	
	TPH-GRO (C6-C10)	ND	200	100	ug/kg	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	104%	70-130%
2037-26-5	Toluene-D8	97%	64-130%
460-00-4	4-Bromofluorobenzene	101%	62-131%
17060-07-0	1,2-Dichloroethane-D4	100%	70-130%

Method Blank Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V2125-MB	3V37229.D	1	06/14/16	AJ	n/a	n/a	V3V2125

The QC reported here applies to the following samples: **Method:** SW846 8260B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	50	25	ug/kg	
100-41-4	Ethylbenzene	ND	100	25	ug/kg	
108-88-3	Toluene	ND	100	50	ug/kg	
1330-20-7	Xylene (total)	ND	110	50	ug/kg	
	TPH-GRO (C6-C10)	ND	10000	5000	ug/kg	

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	102%	70-130%
2037-26-5	Toluene-D8	96%	64-130%
460-00-4	4-Bromofluorobenzene	101%	62-131%
17060-07-0	1,2-Dichloroethane-D4	102%	70-130%

Blank Spike Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V2125-BS	3V37230.D	1	06/14/16	AJ	n/a	n/a	V3V2125

The QC reported here applies to the following samples: **Method:** SW846 8260B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	50.2	51.1	102	70-130
100-41-4	Ethylbenzene	50.2	52.3	104	70-130
108-88-3	Toluene	50.2	50.8	101	70-130
1330-20-7	Xylene (total)	151	160	106	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	100%	70-130%
2037-26-5	Toluene-D8	98%	64-130%
460-00-4	4-Bromofluorobenzene	98%	62-131%
17060-07-0	1,2-Dichloroethane-D4	95%	70-130%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V3V2125-BS	3V37231.D	1	06/14/16	AJ	n/a	n/a	V3V2125

The QC reported here applies to the following samples: **Method:** SW846 8260B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
	TPH-GRO (C6-C10)	2010	1930	96	58-130

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	101%	70-130%
2037-26-5	Toluene-D8	96%	64-130%
460-00-4	4-Bromofluorobenzene	100%	62-131%
17060-07-0	1,2-Dichloroethane-D4	98%	70-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D83523-1MS	3V37233.D	1	06/14/16	AJ	n/a	n/a	V3V2125
D83523-1MSD	3V37234.D	1	06/14/16	AJ	n/a	n/a	V3V2125
D83523-1	3V37232.D	1	06/14/16	AJ	n/a	n/a	V3V2125

The QC reported here applies to the following samples: **Method:** SW846 8260B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	D83523-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND		63.2	37.8	60* [a]	63.2	46.2	73	20	64-139/30
100-41-4	Ethylbenzene	ND		63.2	31.9	50* [a]	63.2	41.7	66* [a]	27	68-136/30
108-88-3	Toluene	ND		63.2	34.3	54* [a]	63.2	43.0	68	23	60-130/30
1330-20-7	Xylene (total)	ND		190	96.5	51* [a]	190	126	66	27	58-142/30

CAS No.	Surrogate Recoveries	MS	MSD	D83523-1	Limits
1868-53-7	Dibromofluoromethane	103%	104%	104%	70-130%
2037-26-5	Toluene-D8	97%	97%	96%	64-130%
460-00-4	4-Bromofluorobenzene	99%	100%	104%	62-131%
17060-07-0	1,2-Dichloroethane-D4	101%	107%	107%	70-130%

(a) Outside control limits due to possible matrix interference.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D83523-1MS	3V37235.D	1	06/14/16	AJ	n/a	n/a	V3V2125
D83523-1MSD	3V37236.D	1	06/14/16	AJ	n/a	n/a	V3V2125
D83523-1	3V37232.D	1	06/14/16	AJ	n/a	n/a	V3V2125

The QC reported here applies to the following samples: **Method:** SW846 8260B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	D83523-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	ND		2520	1780	71	2500	1740	70	2	14-174/30

CAS No.	Surrogate Recoveries	MS	MSD	D83523-1	Limits
1868-53-7	Dibromofluoromethane	102%	101%	104%	70-130%
2037-26-5	Toluene-D8	97%	98%	96%	64-130%
460-00-4	4-Bromofluorobenzene	100%	101%	104%	62-131%
17060-07-0	1,2-Dichloroethane-D4	102%	106%	107%	70-130%

* = Outside of Control Limits.

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13670-MB	FI39663.D	1	06/17/16	CH	06/14/16	OP13670	GFI1803

The QC reported here applies to the following samples: **Method:** SW846-8015B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	10	9.5	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	95%	20-130%

Blank Spike Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13670-BS	FI39665.D	1	06/17/16	CH	06/14/16	OP13670	GFI1803

The QC reported here applies to the following samples: **Method:** SW846-8015B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	250	205	82	32-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	107%	20-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D83523
Account: COCSCOG Olsson Associates - Denver
Project: BNN Western, LLC Wildhorse SWD

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13670-MS	FI39667.D	1	06/17/16	CH	06/14/16	OP13670	GFI1803
OP13670-MSD	FI39669.D	1	06/17/16	CH	06/14/16	OP13670	GFI1803
D83523-1	FI39671.D	1	06/17/16	CH	06/14/16	OP13670	GFI1803

The QC reported here applies to the following samples: **Method:** SW846-8015B

D83523-1, D83523-2, D83523-3, D83523-4, D83523-5, D83523-6

CAS No.	Compound	D83523-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	ND		313	247	79	313	218	70	12	20-152/54

CAS No.	Surrogate Recoveries	MS	MSD	D83523-1	Limits
84-15-1	o-Terphenyl	106%	93%	84%	20-130%

* = Outside of Control Limits.